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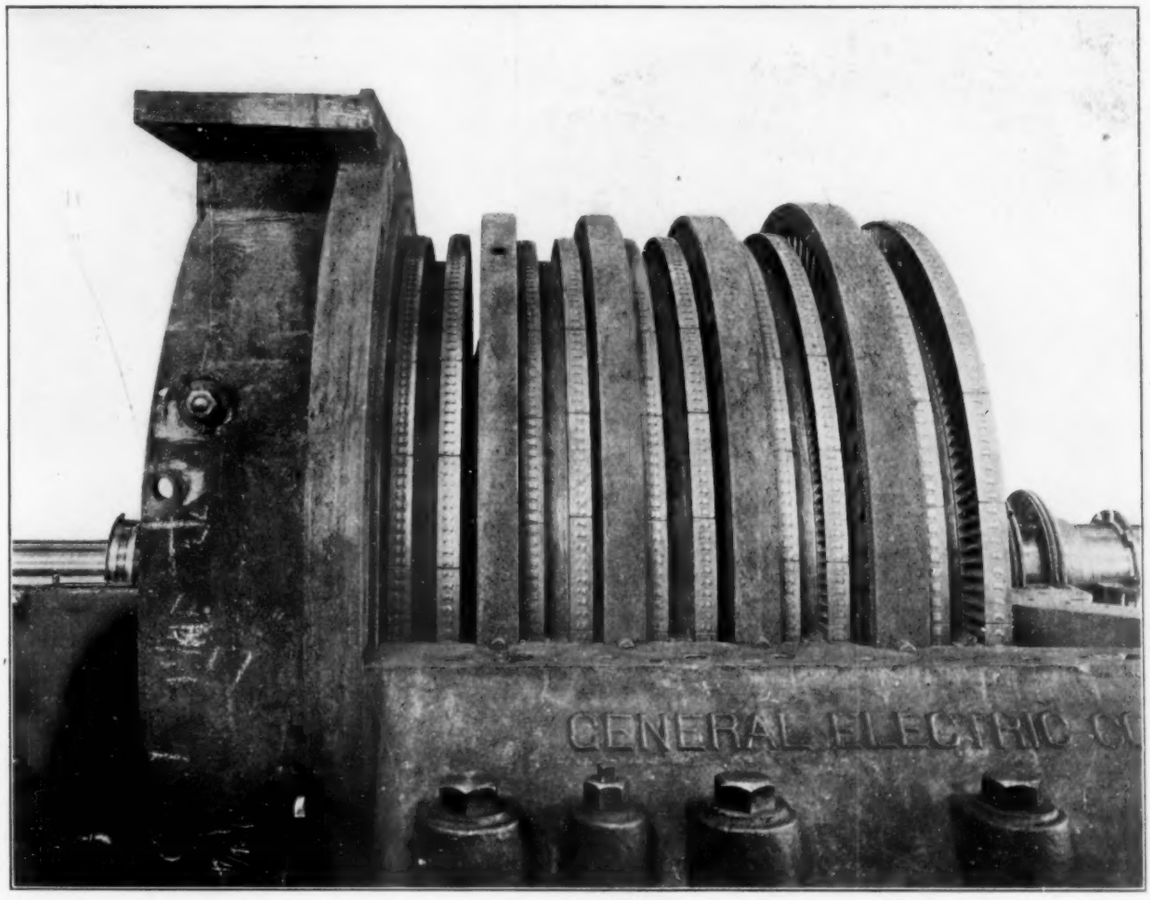
THE MANUFACTURE AND USE OF TURBINE BLADING AND PACKING PIECES*

A Description of the Methods of Production Practised in England.

By W. H. W.

Although only sixteen years have elapsed since the Turbina made her first appearance, vast are the strides that have been made in the various industries associated with the turbine. One of the foremost and most important of which is the manufacture of turbine blades and packing pieces. Before attempting to describe the processes in connection with this industry, it would perhaps be well to define the actual uses of turbine blading, etc., because many of the writer's friends who are not closely associated with the turbine, have often expressed erroneously their opinion that the blades were the ship's propeller; this no doubt is due to the fact that the word blade is used in both instances. Turbine blades are used in the construction of the turbine cylinder, and the steam pressure exerted upon the same causes the concentric drum to revolve, thus obtaining a rotary motion for the shaft on which the ship's propeller is fixed. A description of the fixing, and action of the blades will be given later.



A CURTIS STEAM TURBINE WITH EXTRUDED MANGANESE BRONZE BLADES, MANUFACTURED BY THE GENERAL ELECTRIC COMPANY.

It is not intended to describe the processes of casting and rolling the brass from which the blades are made, suffice it to say that rolled laps, or what are known in the trade as wire bars, are obtained by rolling the cast ingots down to the necessary thickness; these vary in width and thickness according to the size of the blade to be produced.

*A description of the mixtures for hydraulic turbines was published in The Metal Industry, January, 1906.

The bars which are usually about four inches in width and weigh about one hundred pounds each are put through combination shears, which are compomposed of blanks (varying in thickness according to the width of strip required), built up in series on two spindles, and the blanks, or disks, on one spindle are allowed to enter between the disks on the other spindle when fixed in the housings; by this means a number of strips are obtained, all of which are nicely sheared on both edges. The two outer edges of the original wire bar are sheared off as scrap, and returned to the melting pot in due course. This principle is not the only one adapted for this process, as some manufacturers roll down the cast bars to the necessary size for producing the turbine blade; but the method first referred to is the one most generally adopted.

After the bars have been slit the strips are taken separately and wound into coils on a revolving drum fixed vertically, or horizontally according to convenience, and then taken to the muffle for annealing, the latter process being necessary at every stage of manufacture. After annealing, the coils are taken to the shears, and a long point is formed so that the strip may be easily started in the rolls; after this it is rolled through grooves corresponding to the shape that the blading or packing is required to be when finished. Fig. 3 shows the smallest and largest sections of Parsons blade and packing pieces, and from these it will be seen that a considerable number of blades of different sizes are necessary to form the various intermediate stages between these two.

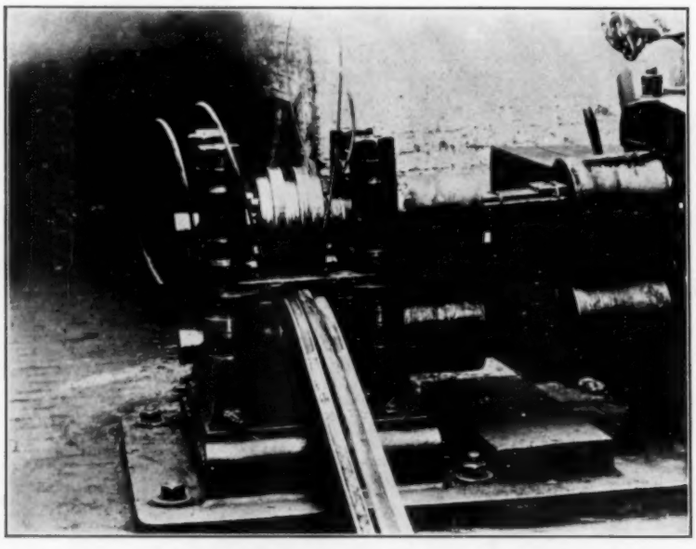


FIG. 1. SLITTING THE STRIP FOR MAKING THE BLADES OF A PARSONS TURBINE.

The annealing and rolling is repeated until the section is ready for the drawbench, where it is pulled through dies punched out to the exact shape of the finished blade to make the die. A roughing punch is made similar in form to the finished punch, but of a more obtuse angle, this is given to the blacksmith who punches several holes in a piece of steel which is approximately eight inches by four inches by three-quarters of an inch thick. These holes are punched until the point of the tool just appears through; it is then ground on the face to remove all projections, and the finishing punch is inserted, the latter being of a more acute angle naturally, only touches at the front of the hole already made. It is then hammered while cold, until a bearing surface of about one-sixteenth of an inch is obtained at the front of the die, The fitter responsible for the finishing of the die then takes what is known as a set piece, or a short piece of blading ready for finishing, and pulls it through the die on a machine specially constructed like a draw-bench but with only a short travel; the set piece is then carefully gauged and examined by an independent inspector and, if passed by him, the die is taken to the draw bench and a string of blading or packing pulled through, after which the die is again hammered up by the fitter and repunched, as the accuracy of the work will not permit two strings to be pulled through one die.

When the string of blading or packing has been pulled to the full length of the bench (which is usually about 20 feet) it is cut off with a circular saw suspended by a swinging arm from the girders above. This arm is constructed of light angles and laths with bearings at the bottom to carry the saw, a weight is suspended from the bottom of this arm through a hole in the bench, and this serves to keep the circular saw at a safe distance from the workman, and all that the latter has to do when required to cut off a piece of blading, etc., is to pull the saw forward and hold it while it cuts off the piece, and upon loosing same it disappears to a safe distance by the action of the weight.

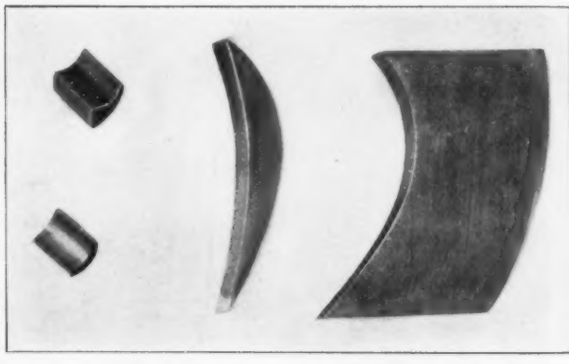


FIG. 2. SHOWING LARGEST AND SMALLEST BLADES AN PACKING PIECES FOR A PARSONS TURBINE.

After this stage the blading is not annealed as it is required by the turbine builders to be as hard and smooth as possible, as the tractional resistance of the turbine blades is a factor which is not overlooked by the turbine experts. The lengths are then taken to another draw bench, on which is fitted a special straightening machine which is similar in construction to a wire straightener, having a number of projecting blocks on one side which come directly opposite the spaces on the other side, and the straightening is effected by the amount of pressure exerted on these blocks, while the strip is being pulled through on the draw bench. The straight lengths are then passed on to the saw bench, to which is attached a rule, fitted with a sliding stop, and the operator cuts the blading into multiple lengths, which are usually specified on the order.

The packing pieces are treated somewhat differently to the blades, because they are required to be as soft as possible when being fitted into the turbine, and for this reason they are annealed after the last process of drawing, and, as the lengths into which they are finally

cut are very short, it is not necessary to supply them in multiples.

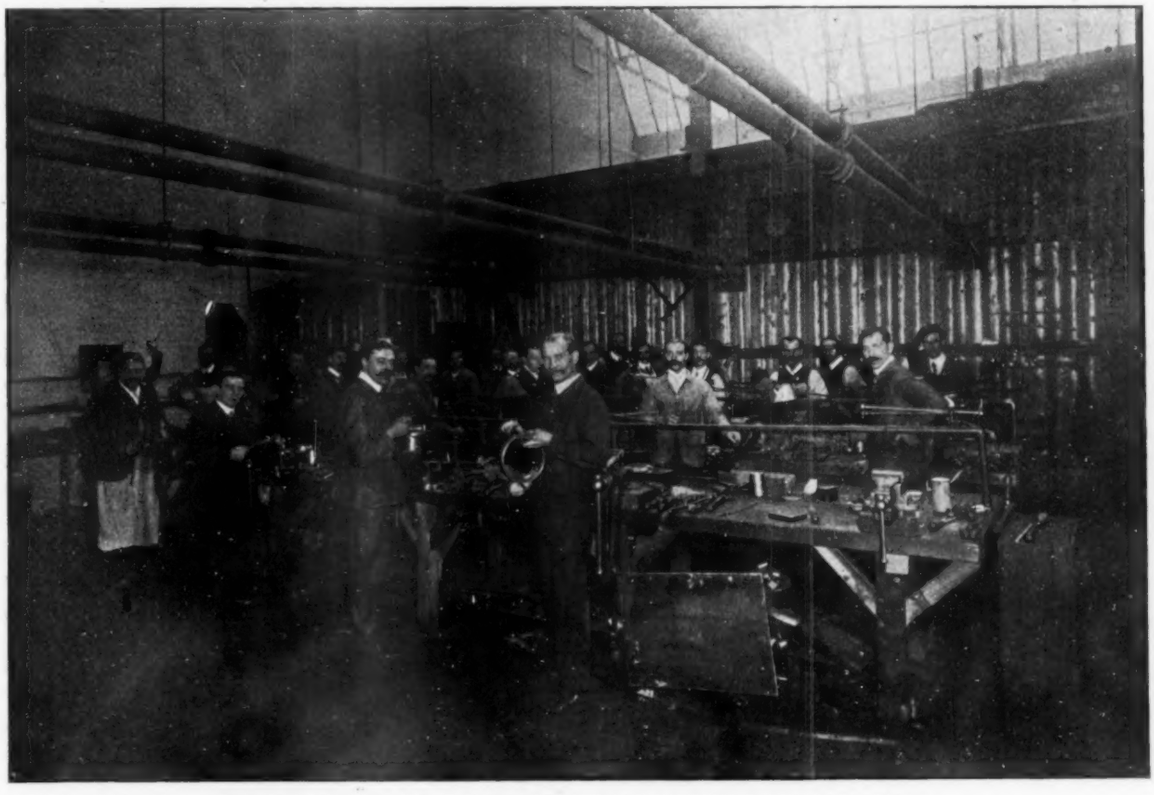
The final examination of the material although not requiring any special appliance except a magnifying glass and a gage, is one of vital importance, and great care is exercised both by the manufacturers and turbine builders so as to prevent any faulty material being assembled in the turbine.

THE USE OF TURBINE BLADES AND PACKING PIECES.

After examination of the blade lengths they are fed through a machine similar to a power press and cut off to the dead length required, and at the same time a number of serrations are formed in the end which is to be fixed with the packing piece. It is then transferred to another machine and the other end of the blade is made thin by milling the convex side for a short distance down. To explain this method more clearly the effect is similar to that which would be produced by extracting the finger of a glove for about one-quarter of an inch, and then squeezing the end.

a portion of the periphery of the rotor or the inside of the casting. These castings are grooved to exactly correspond with the grooves in the rotor casing, and in these the blades are assembled according to the principle adopted by the builder. This method of assembling was not in use at the time that the "Carmania" was built but the advantages of its principle will be easily understood when it is mentioned that there are about 1,115,000 blades in the "Carmania" all of which had to be individually placed and fixed into position, and necessarily occupying a considerable period during which no other work could be put on either the rotor or casing, but with the present method segmental sections are built up contemporaneously with the manufacture of the rotor or casing.

The magnitude of the work of assembling is further illustrated by mentioning that the circumference of the high pressure rotor in the "Mauretania" is 288 inches, and the low pressure 420 inches, while there are no less than 50,000 blades in one rotor. After the blades are strung up in complete sections they are



THE DIE SINKING DEPARTMENT OF A PARSONS STEAM TURBINE PLANT.

After this process the tips of the blades can be brought nearer to the outer casing, which not only produces a greater efficiency in the turbine but should one of the blades through mechanical defect or otherwise come into contact with the casing, the effect would be to turn over the thin edge instead of stripping the blades, as would almost inevitably be the case if the blades were left the full thickness.

The packing pieces which have two parallel sides (See Fig. 2), when looked at from a cross section, take corresponding curves to that on each side of the blade, are then cut up into lengths corresponding with the depth of the groove into which they are to be fitted. For the purpose of assembling the blades and packings, castings are made which correspond with

trued up in the vertical line ready for transferring to the turbine, after which they are caulked into position by suitable tools made to go between the different sizes of blades, so as to force the packing pieces into the small serrations in the blade, and as the surface of the rotor blades may be anything between 200 and 300 feet per second the fixing has got to be very securely done or the centrifugal force would extract the whole of the blades immediately the rotor commenced to revolve.

After the segments are fixed the blades project inwardly from the casing, and outwardly from the rotor, or concentric drum.

The rows of blades in the casing projecting inward nearly touching the periphery of the rotor while those

standing out from the rotor lie between those projecting from the casing, and their extreme ends nearly touch the inside of same. The casing and rotors vary in diameter, being smaller at the high pressure than at the low pressure end of the turbine with the result that the blades, when fitted to a finished rotor appear to be in a series of steps, this method of fixing being necessary to allow for the expansion of steam. The expansion of metals is also of serious consideration and the projecting blades of the rotor are always kept at a distance from those in the casing to allow of a coefficient of expansion at least equal to that of steel although the number of blades in a low pressure turbine are considerably less than in a high pressure turbine, on account of the rotor and casing being shorter, they are considerably larger and longer than in the high pressure. After the whole of the blades are fitted in the turbine (for which purpose it is necessary to have the casing in two halves) the steam is allowed to enter and impinge in the first fixed row of blades in the casing from which it is projected on to the first row of moving blades (which are fixed in and projecting from the rotor) imparting a rotational force to them after which it again comes in contact with a fixed row of blades, and its course is again diverted, and so the process is continued through each successive row of fixed and moving blades.

Some five or six years ago many experiments were being made for the purpose of discovering the most suitable material for making blades, but less energy seems to be exerted in this direction at the present time on account of the fact that the special mixture of brass used appears to be giving excellent results so much so that if drops of condensed water impinge on the blades at a velocity anything less than 500 ft. per second, the effect could not be detected, and as this velocity is greater than that of the Parsons turbine the blades may well be said to be almost everlasting.

MANGANESE BRONZE

A Description of a Practical Method for Making this Alloy Never Before Published.

By W. R. Dean.*

When manganese bronze first came on the market and its usefulness became known many foundries attempted to make it with varying results. Those who persisted and had money to spend experimenting succeeded and today we have various brands all claiming to be the best.

W. R. DEAN.

Manganese bronze is a very misleading metal; there is a great tendency among the manufacturers of this metal to fool the public and try to fool themselves by getting high tests in chills which can never be reached in a sand casting. It is possible in chill castings (test bars chilled in an iron or copper mold) to get 82,000 to 83,000 pounds tensile strength with likewise high elastic limit and elongation; elastic limit of 41,000 or 42,000 and 20 to 30 per cent. elongation, according to the carefulness of the melter and the conditions under which it is poured. I want to say right here that the elastic limit varies with the one reading the machine; very often the yield point is taken for the elastic limit, which makes it high.

The yield point is the point where the metal yields and breaks. Now it is hard to define just where the elastic limit is; by the divider test it is much higher than by the slow extensometer test. Often by varying the proportion of copper, tensile strength can be made to go over 100,000 pounds by sacrificing the elongation. This is in chill castings. Now, chill castings don't show us the strength of the sand casting, they exaggerate. A test from a strictly sand casting wouldn't show much over 65,000 pounds tensile strength. There has been a committee appointed by the American Society for Testing Materials to standardize the specifications for manganese bronze, but as yet nothing has been done. When this committee gets standard specifications adopted a long step will have been taken towards the doing away with the bluff carried on by the makers of manganese bronze. Now it is a case of who can work the biggest bluff over 65,000 pounds tensile strength for a sand test bar.

Of all the non-ferrous metals, manganese bronze is the hardest of all to melt and cast. Two different foundries might use the same formula with different results, due to various causes. Manganese bronze is a misnomer as a bronze, rightly speaking is a copper and tin alloy. The real name as we know it should be manganese brass, as it is a mixture of copper and zinc with a small amount of other metals put in for different reasons. Such as iron for strength, aluminum for fluidity and elimination of dross, etc. At the proportion of copper and zinc used in cast manganese bronze the color assumes a reddish tint about the color of 18 K. gold or the color of a tin bronze.

The name is also a misnomer as very little manganese is used in the composition (the proportion varies with different formulas); in Parsons only a trace is found on analysis but in that put out by the Electric Smelting and Aluminum Company of Lockport, N. Y., made from their manganese copper nearly 3% is shown. What this varying the proportion of manganese will do I will take up in another paper. Manganese bronze was first discovered by Mr. Percival Parsons of England in 1876 and since then has undergone many changes until it has reached its present form of perfection. Parson's manganese bronze, although the first is now equalled and sometimes excelled by other brands.

Before manganese bronze can be made we must prepare an alloy of ferro-manganese, iron and tin. This is necessary as copper and iron unite only at a very high temperature and by making an alloy we lower the temperature of the resulting alloy below that of the virgin metals and have a homogeneous mass. Manganese unites readily with iron and is

*Foundry Foreman, Peck Bros. Co., New Haven, Conn.

used in the bronze as a carrier of the iron while also performing other functions.

Manganese has a great affinity for oxygen and when copper has absorbed oxygen, the metal is logy and the temperature is lower. Now the manganese takes up the oxygen and some of it passes off as an oxide of manganese raising the temperature of the copper and at this stage the iron and tin in the alloy is taken up by the copper. If we try to alloy the iron separately we would be unsuccessful; we might alloy some of it, but we couldn't alloy an exact proportion, as we must do to get the highest results. The specific gravity of iron is lower than copper, therefore the iron floats on top of the copper and it would take a long time to get the copper hot enough to melt all the iron and have it alloyed, as they unite at a high temperature only.

If manganese is put in at this stage, by driving off some of the oxygen we might get some of the iron alloyed, but this would be a slow and unsatisfactory way; hence the steel alloy, so-called. Everyone knows that the fusing point of an alloy is lower than the fusing point of the virgin metal, having the highest fusing point entering into the alloy. This is always so. Thus the fusing point of the steel alloy is lower than the fusing point of steel. When we add the alloy to the copper and the alloy has apparently all melted, we can put in the aluminum and again raise the temperature of the copper, as considerable heat is given off when the aluminum begins to melt, and in this

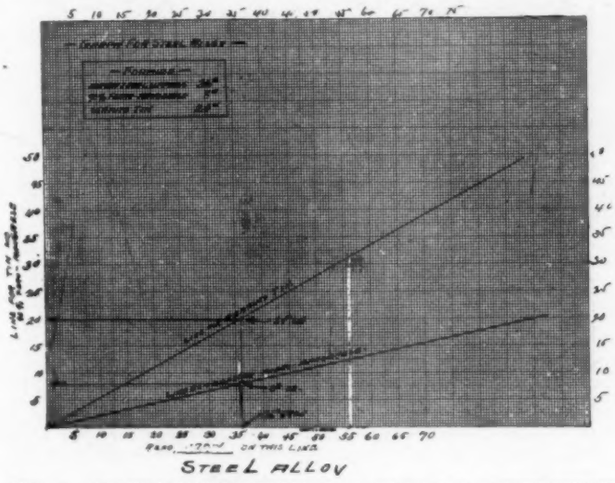


FIG. 1. DIAGRAM WITH IRON AS A BASE FOR DETERMINING PROPORTIONS OF MANGANESE AND TIN.

way helps to melt any alloy left and unite it with the copper. Aluminum has a great affinity for oxygen and more or less passes off as an aluminum oxide, thus raising the temperature of the copper. The tin is added to the alloy to still lower the fusing point below what it would be with the iron and manganese alone.

MAKING THE ALLOY.

To make the steel alloy, a high temperature is needed to melt the iron and manganese and the fire will have to be pushed to its utmost. A Number 60 or 70 crucible is a convenient size to use and three-quarters filled will make alloy enough for some time. One of the most necessary things to have in making the alloy is good charcoal. The charcoal should be about nut size and be of good quality, free from dirt and dust and clay. Another necessary article for the successful making of the alloy is borax for a flux. In the bottom of the crucible put a big handful of charcoal, enough to cover the bottom so as to keep the iron from the bottom of the crucible, this will prolong the life of the crucible, then put in the iron, then the manganese and on the whole mass sprinkle a handful of borax and over all put charcoal to exclude the air.

The crucible should also be covered. The crucible is now ready for the fire. Hard coal is the best fuel for melting the alloy in a 60 or 70 crucible as it lasts better than coke. A good body of coal should be put under the crucible as it must last until the alloy is thoroughly mixed. It takes longer by 2 or 3 hours to melt steel for the alloy than it does copper. It takes skill and practice to tell when the steel and manganese are thoroughly alloyed, the little particles of charcoal on top deceive one who hasn't had practice under some one who can tell. Constant stirring when all seems to be melted will alloy the ingredients thoroughly. A crucible for alloy making won't stand more than one heat and will sometimes leak on the first heat. The charcoal on the bottom prevents the steel and manganese from eating through so that the pot will last one heat and sometimes 2, after which it can be used for composition.

THE FORMULA.

Select good Norway iron or wrought iron clippings from a blacksmith shop. If one is careful in melting and casting, all reasonable specifications can be met with wrought iron clippings and at a much less cost. This is where some concerns make the money on manganese bronze. They know how to meet requirements with cheaper materials. Carefulness in alloying does the trick. Use ground 80% ferro-manganese and good Straits or Banca tin.

Norway iron clippings	36 pounds.
80% ferro-manganese	8 pounds.
Straits or Banca tin	20 pounds.

Following is a graph for getting any proportion with the iron as a base. Read the horizontal line for iron and the vertical lines for tin and manganese. Read in pounds thus:—Say we have 42 pounds iron that falls on the vertical line (where the number 42 intersects the diagonal) for 9¼ pounds manganese and 23¼ pounds tin. The tin is put in just as we are ready to take the alloy out of the fire and is thoroughly stirred. The tin is put into the steel alloy to lower the fusing point. An alloy of low fusing point lowers considerably the fusing point of the alloy it is added to. The object of the tin in the bronze is to give toughness to the metal and increases the elastic limit.

MAKING THE BRONZE.

Now that we have the alloy made, we are ready to start the bronze. To get the highest possible test Lake Copper should be used; electrolytic while sometimes purer isn't as good for manganese bronze as the small amount of impurities in Lake copper seem to be a help. The quality of the copper alone isn't the only thing to be taken into consideration, the quality of all the virgin metals should be the best. For the very best quality bronze Bertha spelter should be used. Bertha is almost absolutely pure being practically free from lead, one of the most detrimental metals to manganese bronze.

For a poorer bronze use Horsehead White Bronze, Golden Rod and M. & H. in the order given. For a good many castings M. & H. will give satisfactory results and is cheaper than the other spelters.

(To be continued.)

A FEW SUGGESTIONS ON TURRET LATHE WORK IN THE MANUFACTURE OF BRASS GOODS.

By E. Dietz.

In turret lathe work, perhaps more than in any other machining operation, the amount and the accuracy of the work produced depends to a great extent upon the small tool equipment used in its production. The fact that the output of the machines or the quality of the work are not what they should be, can in most cases be traced directly to faulty tools in the turret. As the conditions under which the work is being done vary considerably, it is impossible, within the scope of an article of this kind, to more than make suggestions along general lines.

These suggestions, to be of value, should be worked out and modified to meet the conditions of individual cases. It is assumed that the machine tools are in good condition, or to be more specific, that wear on the

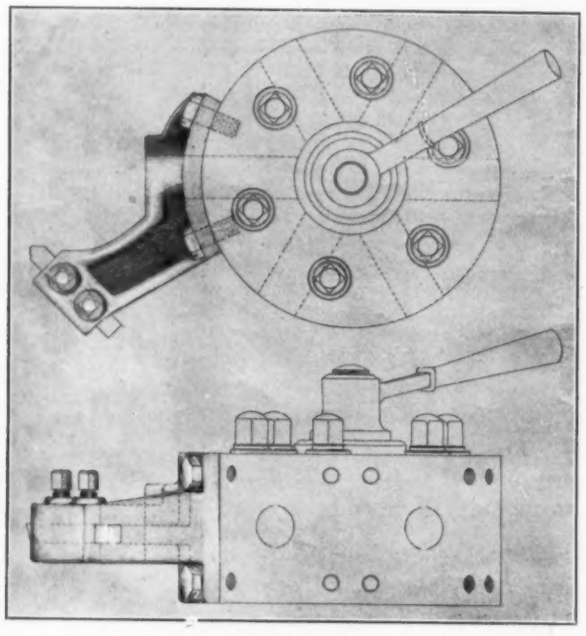


FIG. 1. SIMPLEST FORM OF A TURNING TOOL.

headstock spindle and bearings is taken up, that the cross and turret slides are properly adjusted, that the alignment of spindle and turret is correct and that the indexing and locking mechanism of the turret perform their functions properly. The subject of chucking the work and the various devices employed to hold and drive the work during the machining operations will be treated in a later article at length and we will proceed to the consideration of the turret equipment.

OPERATION ON A TURRET LATHE.

The operations performed by tools held in the turret may be roughly divided into turning, boring, drilling and internal and external thread cutting operations. Considering the tools in the order named, we having in Figure 1 one of the simplest forms of turning tools. The body is of cast iron and the blade or cutter, a standard shape of high speed steel. It is readily reground and reset, as a very close adjustment is not necessary, the tool being used practically only for roughing cuts.

In order to eliminate as far as possible the springing of the tool under the cut and to secure a rigid support for it, it is held to the turret by means of a flange and four cap screws as shown in Fig. 1, the shank of the tool fitting into the turret, holes being used for centering and locating only. Of course this method of fastening necessitates the drilling of holes into the turret body. It could also be objected to on the ground of lack of interchangeability as the turret bodies of machines of a certain capacity made by different manufacturers vary in diameter. The holes, however, can be drilled with a very simple and inexpensive fixture, which assures uniform spacing and

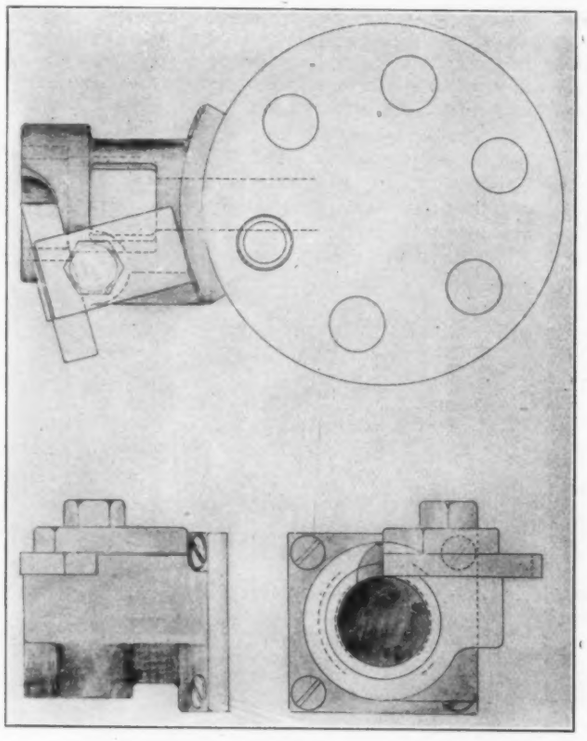


FIG. 2. BOX TOOL WITH SO-CALLED OVER-SHOT BLADE.

the variation of turret diameters can be taken care of by using crowned washers under the flange.

The first cost of the flanged construction is slightly higher than that of the usual round shank, but it is the writer's opinion that this is more than offset by the longer life of the tool, the lower cost of upkeep, and the unquestionably greater rigidity.

Fig. 2 shows a box tool with the so-called overshot blade. In this tool the work is steadied or guided in a hardened steel bushing of the same inside diameter as the finished portion of the work. The blade is set and clamped at an angle of about 75 degs. with the center line of the tool and tangent to the diameter of the finished work. These tools are well adapted to accurate and rapid finishing operations and if properly made and kept in condition leave little to be desired.

As will be noted the body is of cast iron, it is provided with ample openings top and bottom to prevent the accumulation of chips. The steel guide bush-

ing should be secured in place in the body of the tool and ground to the proper inside diameter in order to secure perfect alignment. This is very important in tools of this class. The blades should be machined all over, particularly if used for chamfering or facing at the same time. The grinding of the blades should be done on a universal grinder or a simple fixture may be mounted on an emery wheel stand. Cup shaped wheels are necessary in order to obtain uniform results.

Fig. 3 shows a turning tool intended principally for comparatively long work requiring accuracy and a good finish on the turned portions. The general design of the tool is the same as the one previously shown, the difference being the mounting of the blade. This blade instead of being clamped rigidly to the body of the tool is mounted in such a way as to allow its being removed from contact with the finished surface of the work on the return movement of the turret.

The operation of the tool as well as its general construction will be clear by referring to the accompanying sketches.

A is the body of the tool made of cast iron and provided with cored openings to prevent the accumulation of chips.

B is the tool holder hinged to the body of the tool at C.

It is held to its normal working position by the arm D resting against the locking pin E. This locking pin E is withdrawn automatically by the finished portion of the work passing into the body of the tool against the adjustable stop F.

The minor details of construction are plainly shown on the sketches. As soon as the pin is withdrawn the hinged tool holder is forced back by the spring H and the blade is raised up. The turret may now be backed away and the tool withdrawn over the machined portion of the work, without stopping the machine or marring the finish of the piece.

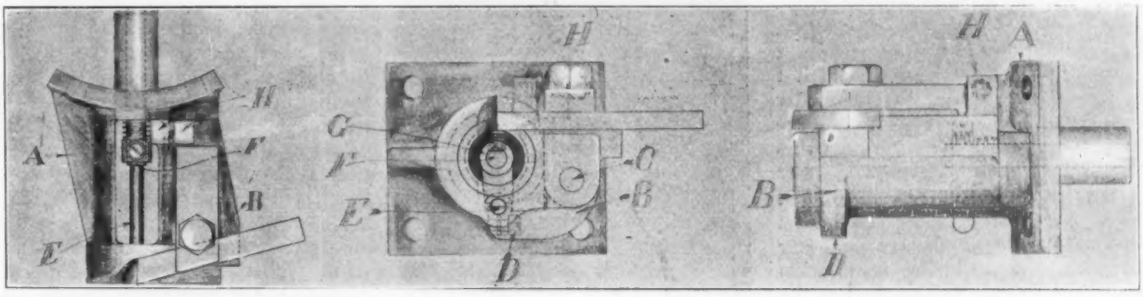


FIG. 3. TURNING TOOL INTENDED FOR LONG WORK WHERE ACCURACY AND GOOD FINISH ARE REQUIRED.

Of course a tool of this description is not suitable for heavy roughing cuts but is particularly adapted to the finishing of such parts as valve and other spindles that extend through stuffing boxes and require a high finish on that portion.

(To be continued).

SECRET OF BRONZE CASTING IN SIAM.

FROM UNITED STATES VICE-CONSUL-GENERAL CARL C. HANSEN, BANGKOK.

According to old records, the art of bronze casting was introduced into Siam by the Chinese in the eleventh century. However, bronze has been known throughout Indo-China since earliest times, as shown by the finds of bronze hatchets and arrowheads in limestone caves and other places of deposit of prehistoric remains. Ancient bronze figures of Indian divinities and of the Buddha testify to the early employment of the bronze founders in these cults in Siam.

Figures of the Buddha are found in the north of Siam in great numbers on the sites of ancient temples which have been crumbling for centuries, leaving the majestic bronze figures standing inclosed by great forest trees, and for worshippers only the wild beasts of the jungle. The interesting point about these figures is the perfect condition of the bronze after centuries of exposure to a tropical sun and rains.

This bronze is called by the natives "samrit"—the perfect or auspicious alloy—and its composition for a long time remained a mystery, until a few years ago the formula was discovered by Major Gerini in an old Siamese manuscript belonging to the late king, of which the following is a translation, with remarks by the Major:

Take 12 ticals (1 tical equal to one-half ounce avoirdupois) weight of pure tin, melt it at a slow fire, avoiding bringing it to red heat. Pour 2 ticals' weight of quicksilver, stir until the latter has become thoroughly absorbed and amalgamated; then cast the mixture in a mold, forming it into a bar. Take one catty in weight (80 ticals) of refined copper and melt it. Then gradually incorporate with it the amalgam, keeping in the meantime the fused mass well stirred.

When this has been done, throw into the crucible a sufficient quantity of ashes obtained from the stems of the bua-bok (terrestrial lotus) creeper, so as to cover the molten metal. Remove the dross with an iron ladle; the metal remaining is samrit bronze. According to this recipe the proportion of the ingredients employed in the manufacture of the alloy in question thus proves to be: 85.11 copper, 12.76 tin, and 2.13 quicksilver. A late qualitative analysis shows that this alloy also contains traces of gold, silver, and iron.

One of the best known statues of the Buddha cast of samrit bronze may be seen in the city of Pitsanuloke, Siam. This figure dates from the beginning of the eleventh century, and ranks among the most beautiful objects of art that the Siamese have ever produced.

Samrit bronze was also much used in old days for casting vessels and implements for sacred uses, and was supposed to be endowed with mystic qualities.

The art of casting bronze Buddhas still forms quite a home industry in Siam. The method followed is to mold a figure in clay and coat it with wax, and then apply a coating of clay; the wax is melted and the metal poured in; when cold, the mold is broken and the figure cleaned and polished. In the temples of Bangkok may be seen many fine specimens of modern statues of the Buddha, which compare favorably with similar art of other countries.

FOUNDATIONS FOR DROP PRESSES.

SOME SUGGESTIONS AS TO THE PROPER INSTALLATION OF HEAVY METAL WORKING MACHINERY.

BY GEORGE WILLIAM PECK.*

Covering the period of about thirty years with which I have been connected with the selling and manufacture of drop presses, the question of the proper foundations for these machines has arisen many times and I have found that many opinions have been formed from the results of personal experience. Having noted these different results I have formed some conclusions which I will endeavor to give in this hurriedly written article and will also give some descriptions of experiments along this line, with the results attained. After noting the results of these different methods I have come to the conclusion that, if drop press anvils are properly proportioned, that all the foundation required is such as will prevent the settling of the machine from its own weight. The anvils can be made heavy enough to absorb all of the effect of the blow of the hammer, or enough of it so that it will not be transferred to the foundation. It was formerly thought that the proportion of ten to one between the weight of anvil and hammer was sufficient and with a blow of only 30 inches in height and with proper foundation it was enough. Now, as to the proper foundation with a ten to one anvil, I would say that the results of experimenting has shown that wood placed on end makes the best as to the effect of the blow on the work but has the disadvantage of not standing up well or rather of going to pieces from decay. In one concern, using foundations of this kind, after an experience covering several years, they found the average life of the timbers to be from ten to fifteen years. Of course the condition of the earth about the timbers would determine this to considerable extent. They also found that, although the use of a solid block of stone obviated the necessity of renewal of the foundation the breakage of parts of the drop and of dies was of more expense than the renewal of the timbers.

GEORGE WILLIAM PECK.

METHODS FOR BUILDING FOUNDATIONS.

The usual method of making foundations of timbers is, with the smaller anvils, to use a single stick or log of chestnut or other wood least susceptible to decay, standing it on end, after preparing a suitable bed of masonry or concrete for it to rest on. For the larger anvils square timbers are bolted together to produce a top surface larger than the base of the anvil. All that is necessary to hold the anvil when it is heavy, is to spike along the edge of the base, strips of wood. The smaller ones are best fastened with good sized lag screws. There is no doubt but that wood placed on end and of eight feet or more in length makes a very desirable foundation for drop presses in the effect of the blow of the hammer. It has an absorbent effect and for anvils of comparative light weight makes a far superior foundation to that of solid masonry, a large single stone, or a mass of concrete. I remember several years ago having a conversation with the superintendent of one department of a large concern using a large number of drop presses. He was a man of decided opinion and emphatically stated that, in his opinion (and he knew his opinion was correct), there was nothing equal to a solid granite block for a foundation for a drop press and that he insisted on having this kind of a foundation in his department. In answer to my question as to whether he was not troubled with breakages of the guide rods in which the hammer worked, emphatically stated that he was not. Some time afterward while at this factory I made an inspection of the drop presses and found that in all other departments there was not a guide rod broken, and in these departments they had the timber foundations, while in the department using the granite block foundations quite a number of these guide rods were cracked and mended by riveting over the cracks wrought straps. It was quite an object lesson to me although it was very obvious that it would be poor policy to call my superintendent friend's attention to the proof of the fallacy of his theory.

PROPER WEIGHT PROPORTION OF ANVIL TO HAMMER.

In other factories I have been able, where they have used both kinds of foundations, to pick out those drop presses that are on the solid stone by the repairs that have been made on them. Now, I contend that, if an anvil is made heavy enough, the effect of the blow of the hammer will be absorbed to such an extent that not enough of the jarring effect will be transmitted to the foundation to have any destructive action. The question arises as to the proper proportion between anvil and hammer. For a number of years the concerns with whom I have been associated, have made it ten of anvil to one of hammer, and with the timber foundation the results of the effect of the blow has been satisfactory but the expense of keeping the foundations in condition has been considerable; on the other hand, the solid stone foundations, while being more durable, have had the effect of producing more breakages of parts of the machine and also have been more destructive to the dies, particularly on cold stamped work. From time to time conditions have arisen where good foundations could not be had and we have made anvils of various increased proportions, and in recent years have made quite a number with anvils weighing fifteen times the weight of the hammer, even where the matter of foundations did not enter into consideration as much as the effect of the blow. Where the hammer is not raised over 30 inches in height, in my judgment, fifteen to one is a good proportion and will yield as good results as if made heavier.

About six years ago we made some heavy drop presses which were to be used for stamping flat ware and at the request of the concern, for whom they were made, we designed the anvils with the proportions of 15 times that of hammer. These drop presses, the largest of which had a hammer of 1,800 pounds, were to be installed in the first story of a factory under which was a cellar. The building was erected on a ledge of rocks and the bottom was, there-

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fore, of solid rock. This obviated the necessity of the building of masonry to prevent the sinking of the foundation from the weight of the machine and the question became one of the filling between the rock and the bottom of the anvil. For this purpose brick piers were built up tapering to a little more than the size of the bottom of the anvil. The results attained with this arrangement proved conclusively that the principle of heavy anvils was right as the piers would have been disintegrated had the anvils been lighter. After six years' use the drop presses are being moved to an addition to the factory where the conditions are the same and here they will have the piers made of concrete. Another concern, in the same town, in setting up a drop press of same proportions and with 1,800 pound hammer, used timbers bolted together to fill in and you can hardly feel the jar of the hammer by resting your hand on this mass of timbers. With anvils of proper proportion, concrete makes a good foundation. It is easily constructed and is comparatively inexpensive. In making these foundations of concrete it is well, however, to have, imbedded in the top of the mass and flush with it, two large sticks of timber. These keep the concrete from cracking and form a good material, to which spike pieces to keep the anvil in position. It is not a good plan to fill up around the base of the anvil with the concrete as it is liable to crack, from the jar of the machine. It seems a nice plan to fill up around the anvil, when it is long enough to come below the floor, making a concrete surface level with the floor, but I have noticed where they have done this that cracks are liable to appear and there is no doubt but that a better appearance would result with the wooden flooring extending up to the anvil.

MATERIALS FOR FOUNDATIONS.

A very curious condition arose at one time at a factory in which the drop presses were placed in the first story and under which was a very high basement. To support these drop presses, timbers on end were placed in the basement on a solid bed of masonry. These anvils were of a proportion of 10 to 1 and the machines had worked well at another factory on regular timber foundations. However, they did not work at all well on these timbers arranged in this way. They would jump all round on the timbers and did not give good results at all. A cradle was made on the flange of one of the anvils and in this was placed a lot of pig iron with the hope that the added weight would help to hold the anvil steady. It might have, if it had been a part of the anvil, but being detached did not bring about the desired result. While they were discussing this matter with me, it occurred to me that the reason the anvils acted so and that the blow was not absorbed was that they were not surrounded by the earth and that the timbers must spring laterally. At my suggestion a box was constructed around the row of timbers and filled up with dry sand and their trouble was over.

Another concern arranged their foundation similar to the one with tapering anvils, that is, using logs bolted together on end to support the anvils, and filled up around the timbers with solid concrete. While making this foundation they thought it a good plan to provide for more drops for future use and set up the timbers in concrete for four hundred and six hundred pound hammer drop presses. This was all right, but when they found that they needed a drop press with 1,200 pound hammer and had a foundation designed for four hundred pound hammer they saw their mistake. The timbers of this foundation projected above the mass of concrete about a foot. They cut these off level with the concrete and placed timbers flatwise on top of the timbers and resting on the concrete. Being a 10 to 1 anvil it did not work well under these conditions and they were obliged to construct another especially for this machine in another part of the factory. Along this same line we came across a concern having trouble with their drop press, in that it did not seem to give a good solid blow. It was found that the anvil was designed for a hammer of 800 pounds but that a hammer weighing 1,000 pounds was being used in the machine. This factory had a mass of concrete extending beyond other foundations and there was a space of about two feet that needed filling between the concrete and the base of the anvil. To fill this they have bolted together some timbers and stood them on end, just filling the space. It was suggested that in place of the timber a block of cast iron would be better. We made up a sub-base of solid iron, making it heavy enough to bring the weight up to what it should have been for that weight of hammer. We planed off the bottom of the anvil and fitted the sub-base to this, having it project on two sides above the bottom of the drop and flush with the top of the anvil flange. Then heavy bolts were fitted to the two pieces so that they acted as dowels against movement in the other direction. This made practicably a new and heavier anvil and seemed to give as good results as if the anvil was of one piece of the weight of the combined pieces. On very heavy anvils, where it has been inconvenient to handle them in setting up we have made the anvils in two pieces and have had good results.

I have been considerably interested in a number of cases of jarring being transmitted to surrounding property and have known of several cases of damages being awarded for this reason, and a whole chapter could be written on methods used to overcome this jar and noise and the results, but that hardly comes under the head of Foundations. In my judgment, after having noted these results of experimenting along the various lines, it would seem that the whole matter of the proper foundation depends on largely the proportion of the anvil to weight of hammer, although, of course, other conditions, as for instance the conditions of the land, whether solid or composed of quicksands, etc., would enter into it. For anvils of 10 to 1 proportion I favor timbers placed on end, but am strongly in favor of having the anvils made heavier and then making a concrete foundation with inserted timbers, the whole mass resting on a solid bottom.

(To be continued.)

SILVER FINISH ON ALUMINUM.

By Dr. Robert Grimshaw.

Although the natural color of aluminium is silvery, it is often necessary to treat the articles especially in order to bring out this color to the fullest degree. For this purpose, caustic soda is dissolved in water at a temperature of about 110 degs. to 125 degs. Fahr., the article is dipped in this solution, then rinsed in clear water and carefully scratch-brushed with a brass wire brush, being moistened the while with a solution of soap-root and water. The articles are again dipped in the soda solution, then rinsed in water, next re-dipped in the soda solution, rinsed a second time in water, then dipped in a solution composed of three parts of nitric acid and three of sulphuric acid; and finally rinsed in water, They are then dried in sawdust that is free from resin (basswood is the best for this purpose) and at last burnished.

THE BRASS AND COPPER INDUSTRIES OF ROME, N. Y.

AN INTERESTING ILLUSTRATED HISTORICAL TALE OF THIS HUSTLING NEW YORK TOWN.

BY JOSEPH KEATING.

THE METAL INDUSTRY, in its eighth anniversary number, published January, 1910, inaugurated a series of articles descriptive of the origin and growth of the copper and brass industries of the United States. The first of this series covered Waterbury, Conn. (January, 1910), the second (March, 1910), the Naugatuck Valley towns outside of Waterbury, which included Torrington, Winsted, Seymour, Ansonia and Bridgeport, all in Connecticut; and the third (May, 1910), related to Detroit, Michigan, which is rapidly coming to the front as a factor in the copper and brass business.

JOSEPH KEATING.

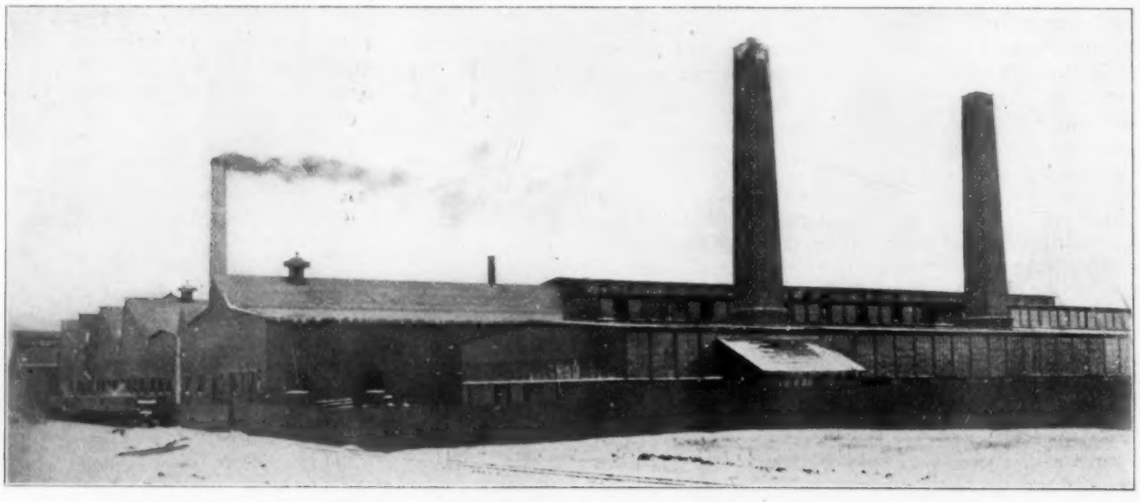
In order to make the series more complete there is a thriving town in central New York that for a long time has had to be reckoned with as an important copper and brass producing center. This town is Rome, and the following article will add to, in a more or less perfect manner, the story of the development of the copper and brass industry of the United States.

Of the history of Rome volumes could be written, and to this the pens of historian and writer have done ample justice. Space prevents even the briefest review of her growth from the sparsely settled portage of "Deowainsta," "the place where Indians' canoes were carried from water to water," to Fort Stanwix and then to Rome of today with a population exceeding 22,000 and a wealth of manufacturing and mercantile interests.

It was back in 1724 that the first mention of "Deowainsta" appears in the history of the Western Continent, and this was in the nature of a complaint made by certain New York merchants of the Provincial Assembly that French traders were given advantages over themselves at this point. In 1875 Fort Stanwix was built on a site which is now the heart of the city of Rome. Around it, during the stirring times from then until the bloody battle of Oriskany, centered many of the most exciting stories of these earliest days in the history of the nation.

The town of Rome was incorporated in 1796, and at that time was a part of Herkimer County of New York State. In 1786 there were five log houses in the vicinity of the fort, and there were none west of it clear to the Niagara River, so that the birth of the city can be placed at a comparatively few number of years before this date.

Today Rome, N. Y., is in the forefront as a producer of brass and copper articles of commerce. Its manufactured wares are known in every quarter of the civilized world, and known as the best of their kind. Considering that to start with, Rome had no natural resources available for manufacturing, and has always been handicapped by a lack of water power, her industrial growth surely is an example of pluck and nerve undaunted, of which the city has good reason to be proud. Its industrial greatness started from a little iron rolling mill built in 1867. This became a brass mill with a couple of dozen of employees in 1878. A copper rolling department was added ten years later. The inauguration of this enterprise then representing the height of industrial development in Rome has resulted in the city's present importance in the world of copper and brass. She ships more freight than any other city between New York and Buffalo, except Schenectady. First, a one-horse rolling mill; now over a dozen great manufacturing plants which consume in brass, thousands of dollars' worth a week, and in copper 25,000,000 pounds a year, or one-sixth of the entire supply which goes into the mills of this country, and work these metals into almost every form for use in all parts of the world. That is the step accomplished in the interesting chapter that Rome contributed to the romance of American business. The man who was behind all this enterprise, the man whose brains, keen foresight and indomitable energy to the largest degree made this possible, was Jonathan S. Haselton, who died in Rome, June 14, 1908.



THE "METAL MILL," LARGEST PLANT CONDUCTED BY THE ROME BRASS AND COPPER COMPANY, ROME, N. Y.

As a matter of fact, Rome's most prosperous brass

and copper industries have sprung up in the last twenty years.

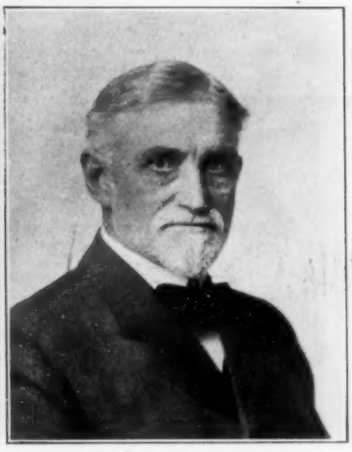
Prior to 1860, Rome had a grist mill, a saleratus factory, a woolen mill, and a cotton mill, all of which had burned down by that year. Toward the close of the year, Addison Day, a Watertown railroad superintendent, started the project to build the rolling mill on the site where the main plant of the Rome Brass and Copper Company now stands. He had the assistance of Alfred Ethridge, W. J. P. Kingsley, B. J. Beach and others who are prominent residents of the city today.

BEGINNING OF ROME'S INDUSTRIES.

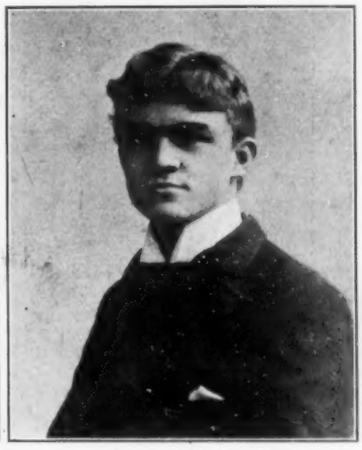
In 1866 the company was formed, in 1867 the mill built and started, the Rome Iron Works being undoubtedly the first corporation formed in Rome, for manufacturing. T. G. Nock was appointed superintendent of the new company, and under his management a puddling mill was added. Fortunately, or unfortunately, the larger part of the Rome Iron Works plants burned down in the year 1871, but on the very day of the fire the trustees voted to rebuild it, showing that they still had confidence in Mr. Day's enterprise. The burned portion of the plant was re-built, "whole thing," and Rome was again very prosperous. In 1882 the Rome Iron Works had elected Mr. Day president of the company, and during his short term of office, the brass industry was saved for Rome, as at that time there was much criticism among the stockholders, as to the wisdom of changing from iron to brass manufacturing. However, his judgment proved right again, for in 1887, the old rail mill, which had been closed for several years, was turned into a sheet copper rolling mill, and little by little, added to its output for its product. For the same reason the Rome Manufacturing Company was organized in 1892, and started in a very small way in the Bingham Block. In 1896, the Rome Factory Building Company was formed to build a home for the Rome Manufacturing Company, and to have available land for other factories. This resulted in the Novelty Company, the Bingham Harness Company, the Tube Company, and the Electric Wire Works, availing themselves of the chance, and then the Brass & Copper Mills, having outgrown their space of land, the Metal Company was formed to take care of the overflowing business, and also to make ventures into new lines. In the meantime, kindred industries had been established in the way of factories,

PROMINENT BUSINESS MEN OF ROME.

JAMES A. SPARGO,
President of James A. Spargo Wire Company.



JONATHAN S. HASELTON,
First secretary-treasurer and manager of Rome Brass and Copper Company. Died June 14, 1908.



BARTON HASELTON,
Present secretary-treasurer and manager of Rome Brass and Copper Company.

with facilities greatly enlarged, the fact not being appreciated at the time, that the re-rolling of iron rails had seen its best days. Then the terrible panic of 1873 swept over the whole country, and Rome suffered much more than any other places, because outside of the railroad shops, the iron business was the main industry here, illustrating the truth of the old adage of "all your eggs in one basket"; in other words, that a number of small industries are better for a town than one large one. For a number of years everything remained at a low ebb, hard times culminating in the underhanded removal of the railroad shops to Oswego, in 1878. But in this year, when the people of Rome felt that they were most bereft, the foundations for the diversified industries of our present Rome were laid, by the starting of a small brass mill in the old Puddling Mill. The credit for this start belongs to Edward Huntington, who, undoubtedly at that time, was acquainted somewhat with the brass industries of the neighboring New England States.

Also about this time, entirely through the efforts of T. G. Nock, the locomotive works were brought to Rome, and for many years these works were the for the manufacture of copper wire, brass bedsteads and automobile attachments.

RISE OF J. S. HASELTON.

When the old rolling mill first began operation, the office boy's name was Haselton. From office boy, Mr. Haselton worked his way through the successive steps of clerk, bookkeeper, timekeeper, secretary-treasurer, and finally president. For the reason that, when he died two years ago, the obscure rolling mill had become the Rome Brass & Copper Company, with four of the largest plants in the State in operation, and over half the men in the city of Rome in its employ, all largely through his efforts, a brief sketch of his life may be of interest here.

Jonathan Sawyer Haselton was born on December 5, 1847, in Lawrence, Mass., and was a son of Nathaniel and Myra Sawyer Haselton. He came to this city with his parents when a very young lad, and was educated in the Rome schools, attending the Liberty Street School. On October 20, 1891, the name of the Rome Iron Works was changed to the present title, Rome Brass & Copper Company, with S. O. Scudder as president, J. S. Haselton, secretary-treasurer, and W. R.

Huntington, vice-president. The practical management of the concern was placed in the hands of Mr. Haselton, and to him was due in a very large measure its success. His ability and general executive talent were apparent from the start, and to him more than to any other one man is due the prosperity of the city as marked by the progress of the company.

As a sequence of the prosperity and growth of the Rome Brass & Copper Company the Rome Factory Building Company was organized to provide a home for the increasing business of the Rome Manufacturing Company, and to provide sites for other industries. By this new company fifty acres of land were purchased in East Rome to the south of the tracks of the New York Central Railroad. Here the Novelty Company, Bingham Harness Company, the Tube Mill, the Wire & Telephone Company of America and the wire plant of the James A. Spargo Company have established homes through the agency of the Rome Factory Building Company. The Rome Metal Company is another offspring of the Rome Brass & Copper Company. It owns 172 acres to the north of E. Dominick street, and is connected with the New York Central Railroad.

The various concerns which have had their start from this brass and copper mill, together with the parent industry, cover 200 to 250 acres of land, and form the principal part of the manufacturing enterprises of the city.

Some time before his death, in order to relieve Mr. Haselton of detail work, Barton Haselton, his son, was elected assistant secretary-treasurer. At a recent election of the officers of the company, President William R. Huntington having died, J. S. Haselton was elected president of the company, and his son, Barton, was made secretary-treasurer to succeed his father. Mr. Haselton, at the time of his death, was identified with the following enterprises in addition to the Rome Brass & Copper Company, Rome Metal Company, Tube Mill, Rome Electrical Company, Rome Manufacturing Company, including the Teakettle Works, and the Long-Turney Manufacturing Company.

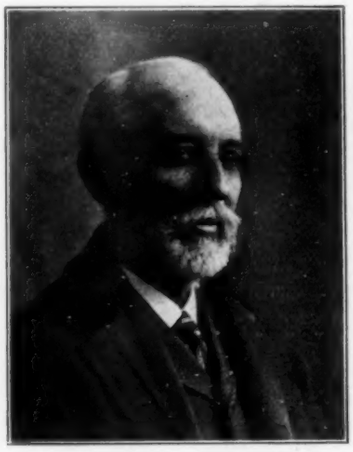
The "big business" of the brass and copper trade in Rome is done by the Rome Brass & Copper Company in its output of brass and copper sheets and bars, seamless brass and copper tubes, rods, tacks, etc. Its brass and copper mills are located opposite each other on the two blocks bounded by Dominick street, the New York Central Railroad, the Mohawk River and the Erie Canal. The other plants, the "tube mill" and the "metal works," until recently operated by separate companies, but now amalgamated with the Rome Brass & Copper Company are located in the eastern part of the city. The "metal works" occupies 20 acres, the brass and copper works together about the same space, but the "tube mill" is not so large. All together they employ over 8,000 men. The finished material from these plants is sold all over the country. In Rome, it is used by the Rome Manufacturing Company in its big plant at the foot of Third street in East Rome in the manufacture of tea kettles, coffee pots, wash boilers, dippers, bed trimmings and curtain poles.

The Rome Metallic Bedstead Company's business also affords an extensive market for the Brass & Copper Company's products. The making of beds is one of the city's most important industries. Over a thousand hands are employed, and the plant covers nearly five acres at the corner of Ridge and Madison streets. Its beds are in use in every part of the western continent. This company was incorporated thirteen years ago with a capital of $25,000, which has since been increased to $600,000. In the busy season a force of 600 skilled workers is employed.

Rome's copper wire mills which turn out all kinds of bare and covered telephone wire have contributed greatly to Rome's prominence in the copper world. The largest wire mill in the city is that of the James A. Spargo Wire Company, which has an annual output valued at $2,000,000. Freight cars carrying 300,000 pounds of finished copper wire start out every week from the branch track that runs into the plant. On the same track is carried away the product of the Spargo Wire Cloth Company, which amounts to about 6,000,000 yards of wire cloth a year. The two plants cover about eight acres. One hundred men are employed in the wire works. The mills together are a monument to the business ability of James A. Spargo. Before 1885 Mr. Spargo was first a machinist and then foreman in the electric wire plant conducted in East Rome by William J. Doyle. In 1869 he withdrew from that company and organized the James A. Spargo Wire Company, starting a plant further east in the city. The business grew so fast that in 1908 Mr. Spargo's company bought 13 acres in the extreme eastern end of the city, and erected first, his wire mill,

PROMINENT BUSINESS MEN OF ROME.

DR. W. L. KINGSLEY,
President Rome Brass and Copper Company.



E. C. CARPENTER,
President Rome Metallic Bedstead Company.

GEORGE A. CLYDE,
Manager of Rome Electrical Company.

and then the plant for the manufacture of wire cloth. The plant in which he started his business career as foreman is now occupied by the Rome Wire Company conducted prosperously under the direction of J. H. Dyett and H. P. Dyett with a capital of $600,000.

Electro-plating is done in Rome at the big new plant, conducted by William J. Doyle, at the corner of John and S. James street. The plant covers half a city block. Mr. Doyle manufactures all kinds of brass, aluminum and composition castings, light machinery, etc., and makes a specialty of polishing, lacquering and nickel, silver, brass and copper plating.

The following are the copper, brass and kindred concerns in Rome:

Rome Brass & Copper Company, East Dominick street; incorporated 1891; capital, $1,600,000. Officers: President, W. L. Kingsley; vice-president, W. J. P. Kingsley; secretary and treasurer, Barton Haselton.

James A. Spargo Wire Company, East Rome; incorporated 1896; capital, $600,000. Officers: President and general manager, James A. Spargo; secretary and treasurer, F. M. Shelley.

Rome Wire Company, East Rome; incorporated 1905; capital, $600,000. Officers: President, J. H. Dyett, vice-president and general manager, F. M. Potter, Jr.; secretary and treasurer, H. T. Dyett. A year ago this company changed its name from the Wire & Telephone Company of America.

Rome Metallic Bedstead Company, Ridge and Madison streets; incorporated 1907; capital, $60,000. Officers: President, E. C. Carpenter; secretary and treasurer, A. F. Carpenter.

Rome Electrical Company, Front and Washington streets; incorporated 1908. Officers: President, Newton H. Jones; vice-president, Thomas G. Nock; secretary and treasurer and general manager, G. A. Clyde.

Rome Locomotive & Machine Works, East Dominick street; incorporated 1881; capital, $500,000. Officers: President, H. Monkhouse; treasurer, Arthur Whyte; superintendent, Elmer Fuller.

Rome Manufacturing Company, foot of Third street; incorporated 1896; capital, $86,000. Officers: President, W. L. Kingsley; vice-president, Barton Haselton; secretary and treasurer, W. B. Johnson.

Rome Turney Radiator Company, Canal street; incorporated 1907 as the Long-Turney Manufacturing Company, but name was changed a year ago. Officers: President, W. L. Kingsley; secretary and treasurer, G. W. Turney.

Rome Hollow Wire & Tube Company, East Dominick street; incorporated 1908 as the Slade Tube Company; capital, $50,000. Officers: President and general manager, Frank DeBisschop; vice-president, James A. Spargo; secretary and treasurer, F. M. Shelley.

NEW GALVANIZING PROCESS.

From United States Consul-General R. E. Mansfield, Zurich, Switzerland.

A new method for obtaining a metallic deposit or veneering, which is claimed by experts to be the most practical and scientific process of galvanizing, is the invention of a Zurich chemical engineer.

The method consists in distributing pulverized and melted metal over the surface of any article by means of a special apparatus, which ejects the solution with such force that the minute particles of the reduced metal adhere in the form of a solid coating that possesses a remarkable homogeneity and appearance. The process may be applied not only to metals of various kinds, but also to plaster, glass, celluloid, wood, or paper. The metallic composition may be of tin, lead, copper, or aluminum, and even gold and silver may be utilized for certain purposes.

PRODUCTION OF VAPORS—ALUMINUM COATING.

These metallic vapors are produced in a temperature varying from 250 degs. to 300 degs., and retained in the apparatus under a pressure of 40 to 60 pounds to the square inch. The great force with which the solution is emitted from the apparatus, and the fact that it passes through a tube in which it is suddenly reduced to a low temperature, admits of the treatment of substances that are highly inflammable and on which the coating acts as a preservative.

The most interesting application by this method is the aluminum coating, a metal that has heretofore been regarded as refractory in galvanic processes. The thickness and the physical character of the coating may be varied to almost any limit, according to the duration of the exposure, the nature of the gas used, the temperature in which the metal is reduced, etc. A thin coating can be obtained almost instantly, whereas a covering of 6 millimeters may be produced in eight to ten seconds. A thick coating is generally made to replace a galvano-plastic or electroplate process, which is applicable on conductive surfaces only.

APPLICATION OF THE PROCESS.

For the practical application of this new process two general categories may be designated, as follows: One for adherent coating destined to embellish or to protect the articles from the effects of the varying temperature of the weather and other physical or chemical conditions; the other, a detachable coating, for reproductions, etc.

The applications under these two categories are so numerous that it is impractical to mention them, but the following are given as examples:

(1) Metallic disguise of plaster, reliefs, moldings of all kinds, works of art, and sculpture.

(2) Metallization of wooden objects, such as aeroplanes, telegraph and telephone posts, boats, and all kinds of carvings, and other articles manufactured of wood.

(3) Metallization of cardboard and articles made of paper, it also being possible to produce imitation metal boxes of cardboard by a metallic coating.

(4) The protection of iron and steel from rusting, for movable and unmovable constructions, such as bridges and turnings.

(5) Metallic cloth impenetrable for gas and water to replace rubber cloth, in the construction of aeroplanes, balloons, asphalt for roofing, tiles, etc.

(6) Metallization of ceramic, glass, and parabolic mirrors for astronomical purposes, etc.

OTHER METHODS OF GALVANIZING.

There are already in use three commercial processes for the galvanizing or coating of metals with zinc. While these processes have for their ultimate object the same result, they differ widely in character and operation. The first and probably the oldest process is that known as the hot galvanizing process, which consists in simply immersing the metal to be coated, either in the form of sheet or manufactured articles, in a bath of molten zinc and scraping or wiping off the surplus. The second process consists in plating on a coating of zinc by means of the electric current. The zinc is contained in a tank or revolving barrel in the form of a solution of a salt of the metal, usually zinc sulphate and using an anode of metallic zinc. The work to be coated is made the cathode and the metal from the solution is deposited on the work by the action of the circuit. Both of the above processes have been thoroughly described from time to time in The Metal Industry.

The third process is known as Sherardizing and is the invention of Sherard Cowper-Coles, of London. The process consists of coating or covering the article to be galvanized with zinc in powdered form and then subjected the whole to a temperature of 500 to 600 degs. Fahr. This process was fully described in The Metal Industry, August, 1904, and subsequent issues.—(Editor.)

CONSTRUCTION AND FINISHING OF BRASS BEDS*

A DESCRIPTION OF THE MANUFACTURE OF THIS IMPORTANT ARTICLE OF EVERY DAY USE.

BY B. H. JONES.†

VARIOUS KINDS OF BEDS.

At the present time the manufacture of brass beds has settled down to two standard types, the plain four post bed and the so-called "round-top." All the various patterns now put on the market by manufacturers are modifications of these two standard types, being made as plain or elaborate as the manufacturer wishes. The tendency just now is towards the plainer styles, such as the bungalow and colonial, although there is some growing demand for heavy cast beds and panel beds. Square post beds are made of solid brass tubing. In round post beds the tubing may be of solid seamless brass, brazed brass, brazed iron lined, or lock joint iron lined. The corner fastenings for the support of side rails or beds are invariably made of iron. Round post beds, with iron lined tubing, may have these corner fastenings (commonly called jaws) cast directly to the posts by enclosing in iron molds, and pouring the molten iron into these molds. This process, of course, destroys the brass in contact with the iron lining, where the molten iron strikes it, and care has to be exercised to see that the brass tubing is not seriously affected immediately above and below the joint.

Casting the iron jaws on in this manner makes a permanent fastening, which cannot be loosened or removed without destroying the bed. This process, however, can only be used by manufacturers who are equipped for melting iron. Where jaws are not cast directly to bed posts, they require to be attached by other means, such as bolts, screws, rivets and by so-called "blind" fastenings. Jaws attached in this manner may be cast or malleable, and to avoid stretching and distorting the hollow tubing it is usual to reinforce this tubing at the point of attaching the jaws by plates inserted and through which the jaw fastenings are secured. There is considerable variation in the styles of jaws used by various manufacturers, although the most common type is for the dove-tailed rail end, while some manufacturers use a jaw permitting of a reversible rail.

On the subject of jaws and type of rail head the bed manufacturers have greatest opportunity to get together and standardize their product. No two manufacturers make an interchangeable rail, or even where they may be making the same type of rail ends and jaw, they vary in their dimensions so as to prevent interchange of side rails of other manufacturers. Improvements in methods of assembling brass beds have practically eliminated soldering, which formerly constituted so large a portion of the work. Pommels are secured into the ends of cross bars and filler tubes, either by swaging or by self-springing into openings provided for projecting lugs. The usual method of putting plain ferrules and rod ends on the cross bars next to the pillars does not make as rigid and strong fastening as the use of open mouth ferrules and rod ends, that is to say, that the part which touches the cross bars or pillars should be cut away.

Round rail knobs have become almost obsolete; about their only use at the present time is for the joining of scrolls together. The rail knob most in use is the hexagon, made with a hexagon head and taper collar, which goes into the hole provided for it, and wedges itself, so that any jolting or jarring will not loosen. This method of fastening rail knobs has eliminated the trouble with children unscrewing the round knobs. In regard to trimmings for brass beds, the tendency is towards the plain. Middle mounts and caps are almost entirely abolished. Casters are now being

ROUND TOP BRASS BED WITH JAWS ATTACHED.

PLAIN 4-POST BRASS BED MADE WITH ROUND TUBING. JAWS CAST ON AND COVERED WITH BRASS TRIMMINGS.

*Paper read at mass meeting of Central Bureau of Bed Manufacturers, held at French Lick Springs, Ind., Dec. 8, 1910.

†Superintendent, Smith & Davis Manufacturing Company, St. Louis, Mo.

made with leg mounts, which does away with the necessity for separate bottom mounts, although thus far these casters have not given entire satisfaction.

FINISHING.

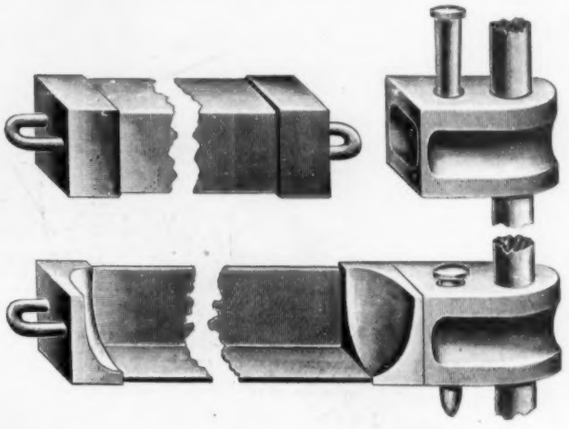
At present there are three standard finishes for brass beds, bright polished, satin finish and polet, which is a combination of the polished and satin finish. The usual procedure with tubing parts is to first thoroughly grease them, then polish with felt wheel, first with No. 60 emery, then with No. 120; then cut down on buff wheel with tripoli, and finally color on a soft muslin buff and rouge. The rouge and grease is next cleaned from the tubing, wiped dry with canton flannel, when it is ready for lacquering.

PLAIN 4-POST BRASS BED MADE WITH SQUARE TUBING, THEREFORE ALL BRASS.

SATIN FINISH.

The same process is undergone as far as and including cutting down with tripoli. The pieces are then given a rubbing with No. 60 dry emery, cleaned and are ready for lacquering. The finishing of the rod ends, husks, vases, mounts and other small parts varies somewhat according to how these are obtained, as many manufacturers buy most of these parts made up and finished ready for assembling.

Lacquering is done either with brush or spray, very little dip work being practiced for lacquering of brass beds. The most generally satisfactory lacquers for use on brass beds are of domestic make and of the celluloid variety. The foreign lacquers containing shellac must be applied on a previously heated surface and are, therefore, rapidly going out of favor. For although such lacquers enable a very fine finishing, they are not desirable for general all around use as the finished work will not stand moisture.



ONE TYPE OF REVERSIBLE RAIL.

THE PREDOMINANCE OF THE ANTIQUE FINISHES.

By Charles H. Proctor.*

The manufacturer who depends upon the vagaries of fashion as an outlet for his product often wonders what new whim the people will take up for the coming year, so he is careful to keep his stock as low as possible to prevent depreciation from unsalable goods. In metallic articles of personal adornment whether made of the rare or baser metals and finished in gold or silver, all have inclined towards the antique during the past year. Very few burnished or bright finished goods have been sold and unless some new and startling finish should be produced the same finishes will predominate, such as rose gold, antique green gold, French gray and oxidized silver. The probabilities are that the old fashioned oxidized silver will be in strong demand, antique brass and antique copper should have a strong hold upon popular favor, especially in the way of the various types of buckles so much in use at the present time. The plater will be put to the test as usual. It is not so much the manufacturing of the articles but the finish that sells the goods. Design means a good deal, but without the proper finish it does not appeal to the eye. The finish gives it that distinct appearance which produces the true contrast between the design and the finish.

*Superviser F. H. Lovell Manufacturing Company, Arlington, N. J.

In the production of antique golds some platers still add arsenic, others carbonate of lead to their gold solutions. In producing the French gray some will still continue the use of sulphurett of potassium and the same method for oxidized silver. These methods have always proved satisfactory when properly handled. Some platers obtain successful results by depositing their grays and blacks from the iron arsenic and nickel solutions, others from iron arsenic and copper solutions. There are so many ways and so many methods of producing the same results. This brings to my mind a method that should give good results for French gray or oxidized silver.

In the production of green gold, arsenic is added to the gold bath, mostly in the form of an arsenic hydrate; that is arsenic dissolved in caustic soda. If this method gives the dark background for gold the same method applied to a silver bath should give the same results. It is well worth the time of an experiment—try it out. Of course it will be necessary to maintain a separate bath, but this need only be of sufficient size for the purpose required. The articles should be plated in the regular bath plus the few minutes required for the antique bath. The method of finishing the articles would be the same as for green gold. This method should give good results with a little experimenting.

VENETIAN MOSAIC JEWELRY

Every tourist and artist who visits Venice, the artistic city of the world, is impressed with the beautiful Venetian mosaic jewelry. This jewelry is not expensive as the base of it is silver, gilded, but it is the beautiful mosaic setting of the work which attracts the artist's eye, and which is so pleasing to the tourist. The illustration shown herewith is an example of Venetian mosaic in the form of a bracelet and pin, but, of course, cannot illustrate the full beauty of the trinkets for the print lacks the Venetian coloring.

It is generally understood that the best quality of this mosaic jewelry, and the larger part of it, is made upon the roof of St. Mark's Cathedral, where for generations a family have been occupied in this fascinating work.

VENETIAN PIN AND BRACELET MAGNIFIED TWO DIAMETERS.

The methods employed in making Venetian mosaic are very simple and have remained practically unchanged from the first productions. It is the general notion that each piece is handled separately and cut and fitted to its successor, making it an individual piece of work. This method has been resorted to in rare instances where a specially fine and individual design was required. The holding of the pieces was accomplished by the use of tweezers suitably covered with a soft material to prevent the breaking of the mosaic. The cutting was done with small pliers, the piece being trimmed to a pattern similar to the cutting of modern stained glass and mosaics.

But the Venetian and Roman worker's method of making this jewelry is as follows: A number of long sticks of glass or other suitable material are arranged in such a way that their ends form a pattern and other sticks are placed around them to make up the ground border to the rest of the design. The pattern is now much larger than is required. The sticks are then heated and fused together, afterwards reheated and drawn down to the required size after the manner of drawing wire, and this makes the small pattern at the end which puzzles the layman. This method also leaves the different colors in their relative positions. The fused design is now cut off in slices and polished and as these slices are quite thin it is readily seen that a number of the same patterns can be made according to the length of the sticks. Sometimes the sticks are cemented together instead of fusing, but the process of manufacture is similar to that of fusing.

NICKEL PLATING

A History of this Valuable Industry and Some Instructions in Plating Operations.

By Percy S. Brown.*

Recent progress in nickel plating has been of considerable importance, and yet this branch of the plating industry has not received as much attention as it deserves. But few articles bearing on this subject have appeared in the last few years, and yet there are inquiries being made continually to trade papers for information as to how certain troubles with a nickel solution can be remedied. Usually the plater sends a sample and asks why it is dark in color and states that his solution is the same as he always used. This is the full extent of the information he gives, and he expects to be told in a few words how his troubles can be remedied. The conventional reply to such questions seems to be, "Your solution contains too little nickel, add single salts to replenish it," or "Your solution is probably alkaline, neutralize with ammonia." There are, of course, other stock answers which might do as well, but it is scarcely to be expected that the busy editor can become a mind reader, go into a trance and find out under what conditions the information-seeker has produced his inferior work. That such a condition exists cannot be disputed, and it is of course not confined to questions on nickel plating. This article was inspired by the condition mentioned and the author's intention is to place before the readers of this article a general idea of nickel plating, its latest progress and other features of possible interest to those who follow this interesting field of electroplating.

PERCY S. BROWN.

NICKEL AMMONIUM SULPHATE (DOUBLE NICKEL SALTS).

Solutions.—A solution made up by dissolving this salt in water until a density of about 6-7 degs. Baumé is reached is the most commonly used because it has been known the longest time. This solution has the disadvantage age that as the nickel content decreases and the solution is replenished by adding more nickel salt the ammonium sulphate keeps increasing in too great proportion. The error that many platers make in adding double salts to the solution simply aggravates this condition. When the single salts (nickel sulphate) are added this does not occur and for this reason all replenishing should be done with the single salts.

NICKEL SULPHATE (SINGLE SALTS).

When this salt is used there should always be added either common salt or ammonium chloride (sal ammoniac), but I prefer the former, as no ammonium salt is then introduced. With either of these salts should be added some boric acid. The salt or sal ammoniac gives conductivity to the solution, helps to prevent oxidation at the cathode and is of great value in dissolving the nickel anode. The boric acid prevents oxidation at the cathode and helps to produce a uniform and bright deposit. This solution should stand at about 12 degs. Baumé, and the proportion of salt or sal ammoniac should be about 3 per cent. and the boric acid 6 per cent. of the total weight of salts used. Variations may be made from these figures without affecting the efficiency of the solution.

* Electro-Chemist, Western Electric Company, Hawthorne, Ill.

NICKEL FLUOSILICATE.

This salt is a new one to the plating trade, and the owners of the patent have not placed it on the market commercially as yet. Its principal advantages are solubility, high conductivity and the production of very dense lustrous deposits.

Other salts.—There are numerous nickel salts placed on the market, but nearly all of them will be found either in France or Germany. These salts are prepared for barrel plating, rapid plating in a still solution, bright plating and other special requirements. The Langbein Pffanhauser Works in both England and Germany have many such salts on the market and a firm in Paris is promoting "Persels," a salt which produces a very bright nickel deposit. With all these new salts on the market and the many improvements in the industry, yet there are many firms who still hold to the old method of plating and will not take advantage of the wonderful progress made in this particular line.

ANODES.

The selection of anodes is of great importance and selection by analysis alone is useless. Buying from a firm known to be reliable is the first consideration, as the method of casting the anode determines its usefulness more than anything else. If the anode is not cast from well refined nickel, and if the proper care is not employed during the casting, the result will be an anode which will either be full of holes or will become pulverent in the solution. With the ordinary anode containing about 7% iron and 2% tin there is not so much chance for trouble, but in cases where pure anodes are required the method used by the manufacturer in his foundry is the most important consideration. Many people still argue that pure anodes are of no value, but when solutions other than the nickel ammonium sulphate are used there is no reason why a pure anode should not be employed. It is possible to use rolled nickel anodes containing over 99% nickel in a nickel sulphate bath as above described and these anodes will dissolve uniformly to a very thin sheet. The makers of "Persels" specify that pure rolled nickel anodes be used in their solution. It is obvious that if iron can be kept out of the nickel solution the deposit of nickel will be free from it and will consequently be greatly improved.

AGITATED SOLUTIONS.

The use of agitated solutions has been rather widely discussed and authors seem to differ as to its advantages. Two methods of agitation are generally used, namely, mechanical and air. Heated solutions are sometimes used but should not receive too much consideration as unless great care is employed the deposits are liable to be spongy. Mechanical agitation requires more or less elaborate apparatus and unless used in conjunction with a device for circulating the solution is open to criticism. Mechanical agitation alone merely jars off the hydrogen bubbles as they form, thus permitting the use of a greater current, but

as it is essential to have the solution constantly circulating this system lacks efficiency. The reason that agitation of the solution is necessary is because by using high current densities the electrolyte is depleted of metal near the cathode and in time the current, instead of depositing metal, is decomposing the water, or other salts in the solution, and the current efficiency is reduced in proportion. By circulating the solution the depletion in metal around the cathode does not take place and high current efficiency is assured.

Solution agitated by air are kept in circulation and hydrogen bubbles are mechanically removed. In order to have this method work efficiently the anodes must be kept clean and the solution must be filtered regularly. The best device for this form of agitation is a small brass tube with small holes drilled in the sides. This tube should not rest on the bottom of the tank but should be at least six inches above it, and should be connected by a rubber hose with the compressed air system.

ADVANTAGES OF AGITATED SOLUTIONS.

There are two great advantages to the use of agitated solutions, one is that it prevents "pitting" and the other that a much higher current density can be used. When the current density can be greatly increased the time required for plating can be reduced in proportion. It is a fact that where agitation with air is used the time is greatly decreased and the deposit comes out just as bright as if the parts were plated in a still solution.

RAPID PLATING.

It is possible to obtain rapid deposits of nickel without resource to agitation but in order to do this a high conductivity solution must be used. The nickel ammonium sulphate solution will not prove satisfactory in this respect but either the nickel sulphate or nickel fluosilicate solution will give excellent results. With these solutions standing about 12 to 15 degs. Baumé and containing the proper conducting salts, a high current density can be employed and the time of plating greatly reduced.

BRIGHT PLATING.

It is possible to obtain a bright deposit of nickel without using special imported salts, but certain precautions must be observed. The parts which are to be plated must be highly buffed and then placed in the solution and a moderate current density used. The time of plating should be slightly reduced and this feature of the process, together with the question of current regulation, must be studied out for each specific case. The solution used is of importance and high conductivity solutions are preferable although good results can be obtained with the nickel ammonium sulphate solution. It is absolutely essential to add to the solution the proper conducting salt and boric acid. In the case of both the nickel sulphate and nickel ammonium sulphate solutions the best conducting salt would be sodium chloride (common salt). The deposit obtained by this method is of uniform appearance and compares favorably with work that has been nickel buffed. For some classes of work it will give absolute satisfaction and if carefully done a close inspection cannot determine whether the parts were buffed after plating or not.

APPEARANCE OF DEPOSIT.

The appearance of the deposit is a good indication of its quality but gives no idea as to the amount of deposit. When the deposit comes from the solution with a bright appearance and close inspection under a strong glass fails to show any pits, unevenness, or crystalline effect it is a fair indication that the deposit is of good quality. If a weight test is used in conjunction with this inspection a good idea can be obtained as to the value of the deposit commercially. Many concerns depend on a weight test alone and others use no test at all, the result being that one assures a deposit of proper weight and the other does not know what is being turned out of the plating department. The firm that uses a weight test can, by standardizing their plating methods, maintain a uniform quality of deposit of a uniform weight, but unless conditions are standardized the weight test is of less value than one would suppose. It is an unfortunate fact that there is no test known that will indicate the quality of a nickel deposit and the quality is of more importance than the weight of deposit. Comparative tests made by the author have shown that nickel deposits of considerable thickness will not stand up in service as well as deposits which are very thin. This is entirely due to the character of the deposit, which is in turn due to the method of plating, solution used and current density. By the use of a powerful microscope and by etching the nickel deposit the author has been enabled to obtain some insight into the character of nickel deposits, but it would be difficult to explain the method as it is dependent on the experience which one has had with all kinds of nickel deposits plated in different solutions and under many different conditions. It is safe to state, however, that a fairly thick deposit of nickel obtained under conditions that are known to be excellent is far superior to a very heavy deposit obtained under conditions that change from day to day.

STANDARDIZING CONDITIONS.

This emphasizes the necessity of standardizing conditions when nickel plating parts which receive rough wear in service. The choice of a plating solution, current density, time of plating, tank load, solution maintenance, character of anodes, distance between anode and cathode, and all other conditions, no matter how trivial they may seem, should be carefully studied and standardized. Unless this is done the manufacturer of nickel plated parts cannot be sure of what he is turning out from day to day. Another point to consider is the cost, a matter of no small moment in these days of close competition. When everything is standardized a uniform output is obtained at uniform cost while when plating is done haphazardly, one day's output may be just right, the next day's may be of poor quality and the next of far too good quality. The last statement may sound amiss but it is a fact that from the cost standpoint too good a deposit can be supplied. Suppose for instance that 2 grams of nickel per square foot of surface is considered standard and you should be producing 3 grams, it is obvious that the cost is greatly increased as one-third more time and one-third more current has been used to produce the result. If the manufacturer is selling a standard article day in and day out at the same price he is certainly losing money, and will in time lose customers as his product will not be uniform and is just as likely to run under requirements as over. When the volume of work handled in the plating room is very heavy and the foreman is being "devilled" to turn out more work, the chance is that he will do so, and it is not surprising that the work is not up to standard. Few people realize that a plating department cannot be pushed like some other departments if the proper standard is to be maintained.

(To be continued.)

BRASS FOUNDRY PRACTICE—THE ART OF PRODUCING.

AN ARTICLE DEALING WITH FLASKS, PATTERNS AND MATCH-PLATES AND THEIR USE.

BY W. J. REARDON.*

The moulding of brass castings can be divided into three heads, namely: rigging flask, patterns and match plates. To be able to turn out work quickly and easily, requires considerable thought. First of all, good rigging is essential, the most important being flasks and moulding boards. The flasks should be interchangeable and bushed with steel bushings and have good, true joints and pins that will not stick. The pins should be ¾ inches in diameter and not less than ⅝ inches. The fitting and drilling of the flasks is important and should be done with a true made jig. If this work is taken care of from the start it will save many castings from going to the scrap pile, on account of the parting overlapping or more commonly known as a shifted casting.

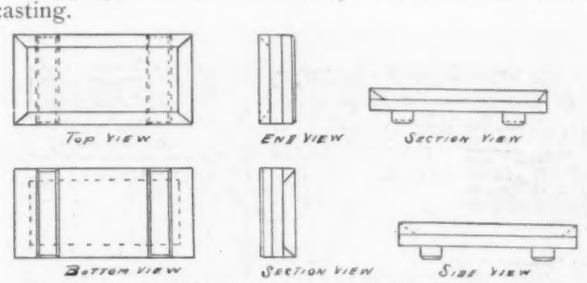


FIG. 1. RAMMING BOARD FOR USE IN POWER RAMMER.

There has been lately placed on the market a rolled steel flask that to my mind is just what the brass foundry has been looking for, for years. I venture to say that this flask will find a ready market owing to the fact that the loss from breakage will be less, but it is up to the manufacturers to make this flask as it should be; i. e., with interchangeable and true joints. The breaking of flasks has caused the brass foundry much inconvenience and cost. Many times the flask has just arrived from the machine shop and is broken in the first day's operation, especially on moulding machines which usually are operated by unskilled men; so to the brass founder this flask would be a great saving of time and money.

FIG. 2. THE PLATE MARKED 2 IS FOR USE IN SNAP MOULDING. 3 SHOWS A ROW OF SNAP FLASKS PILED THREE HIGH.

The snap flask has not met with much favor owing to the fact that it is heavy and of clumsy bulk. The brass foundry moulders contend that they lose time and work on account of breaks and crushes which cause castings to be flat and down in diameter, also shifts on castings, first one way and then the other which are caused by putting the slip over in the mould when brass moulding requires the slip to fit tight on account of the heavy pressure and weight of brass as compared with iron. If it does not go down exactly there is most likely to be a shift. If the slip is a little loose the mould if poured, as it should (i. e., to keep the gate full) will burst out. To overcome these difficulties a close observance of the following practice will be found to be effective: First, ram around the pattern hard enough to sustain weight and to stop straining. If a power-ram machine is used, have a ramming board made like sketch in Fig. 1. This board must fit inside of the snap flask. Instead of using a wooden or iron slip-over, have an iron band made of 1-16 sheet iron and insert same inside of the flask before proceeding to ram, thus you have practically an iron flask. See that the moulder is supplied with weights or plates sufficiently large to cover the top surface of the mould. Fig. 2 shows a plate that I have found to be very beneficial in snap moulding. In fact I have found it very economical to use in conjunction with iron flasks as it saves floor space for by using same you can pile your moulds three high, thereby saving time for the moulder without affecting the quality of the casting thus produced.

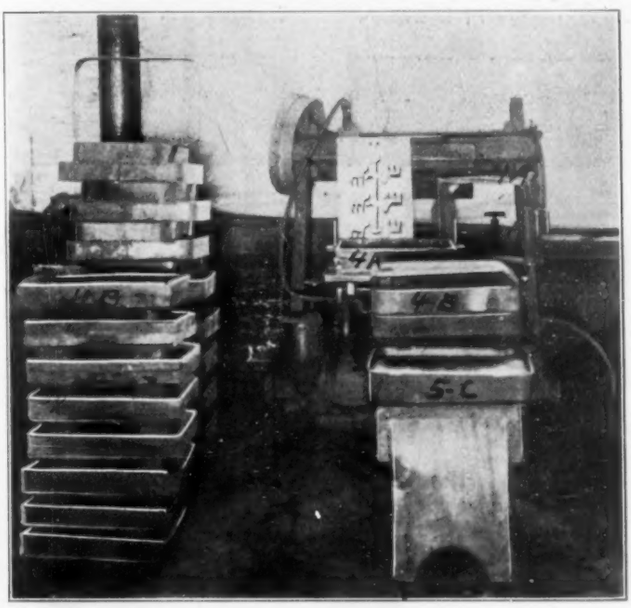


FIG. 3. A GROUP OF FLASKS, FRAMES AND JIGS.

Fig. 3 shows a row of snap flasks stacked three high. Fig. 4 A shows a snap flask that I have adopted after much experiment. This flask is made of aluminum and is strong and durable. It will outwear 25 wooden flasks. There is absolutely no swelling or adjustment of pins as the flask is made with steel pins and bushings. There is no expanding with this metal and as the pins are always in alignment they do not require much attention. Fig. 4 B shows an iron frame that is inserted inside of the snap flask. Fig. 5 C shows the cast iron jig from which all the frames are made so as to insure

*Foundry foreman, Westinghouse Electric and Manufacturing Company, Pittsburgh, Pa.

uniform size. If the above points are properly taken care of, snap flasks can be used in the brass foundry where heretofore they have not been successful.

Where one hundred or more castings are ordered from a pattern they are best made in metal and moulded on a moulding machine. There are very few patterns but what can be put on a plate at a very low cost and with all the improved devices for putting patterns on moulding machines, for good, true castings made like pattern there is none that can compete with castings made from patterns on a plate and used on a power-ram, squeezer or hand ram machine with a vibrator attached to the plate. For jobbing work where a limited number

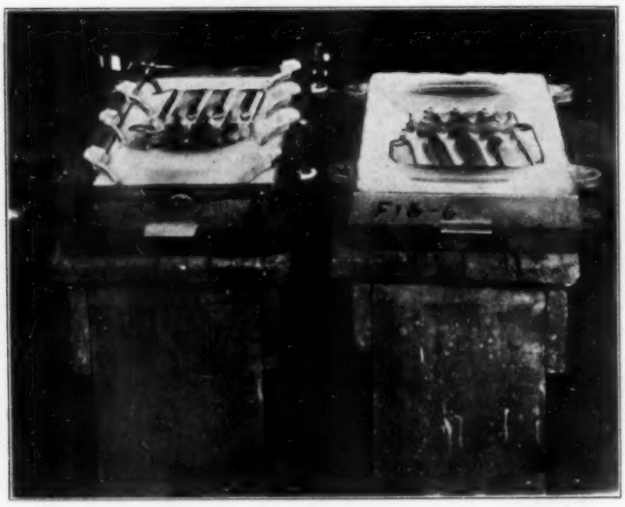


FIG. 4. A MOLD IN COURSE OF CONSTRUCTION.

of castings are wanted a plate cast in white metal will be found the most economical, for when the order is completed, the plate may be remelted and used for another plate by using the following mixture of 55 parts tin, 45 parts zinc and 1 ounce of bismuth. The master patterns to fill the mould may be made of the above mixture without any shrinkage by rapping the patterns slightly and with careful work on the part of the moulder, all that is necessary is to cut off the gates and emery cloth the castings and they are then ready to make the plate. The operation of putting patterns of this character on a plate, no matter how irregular the parting lines may be, is very simple. To make a mould in a large enough flask to take care of the size of the plate you wish to make, simply lay the strips between the cope and drag, to allow for the thickness of the plate—¼ inch has been found satisfactory for plates for a 12 x 16 flask.

Fig. 4 shows a mold in the course of construction. Note the brass strips laid inside of the mould to raise the flask for the thickness of the plate. See that the pattern plate is made in a good, sound flask having well fitted pins not only when the flask is closed but see also that it fits well when the strips are laid between the cope and drag to allow for the thickness of the plate. Have a careful moulder make the mould in the ordinary way except with greater care. Too much care cannot be used in getting the partings just right before the cope is rammed as the success of the plate depends upon this. In ramming the cope, care must be taken not to ram the partings down as it will spoil the mould. A perfect lift is necessary and it is much better to destroy the mould and make a new one than to attempt to patch a mould from which a pattern plate is to be cast.

A good moulder will make two of these plates in a day at $4.00 per day and the pattern maker can drill the holes and clean the two plates in one day at $4.00 per day which would make the cost of one plate $4.00. This cost does not include the value of the material in the plate but as I have previously mentioned you can remelt the plate and use the metal for a new plate. However, if you wish to retain the plate (the weight of which will not be over 25 pounds) for ordinary work you can do so and the total cost of pattern would be approximately about $15.00. It can be used on a moulding machine, power-ram and squeezer or rammed by hand on the bench and with careful handling will last for years.

Fig. 7 shows a number of these plates and castings made by the above method and on power-ram machines, ramming the cope and drag in one operation. Another advantage the pattern plate has over gated patterns is that on a hard sand match or plaster match when the

FIG. 5. A GROUP OF PLATES AND CASTINGS MADE BY THE REARDON METHOD.

parting lines around the pattern are irregular with deep vertical sand to sand partings, great care and skill must be taken so as not to disturb or break the mould, while with a metal plate, a much cleaner lift can be made with unskilled labor. Then with a moulder on a gated pattern, another advantage of the plate is the fact that all castings will be uniform in size and no variation in the weight; while on a gate, very seldom two moulds are rapped the same, consequently different size castings and weights are the result.

MOLD PATTERNS ASSESSED.

Not Entitled to Free Entry Under New Tariff.

The board of appraisers has made a ruling in which it is held that the tariff act of 1909 does not contemplate the free entry into this country of iron molders' patterns for use in making sand molds, wood patterns and brass patterns. The identical issue arose under the preceding act of 1907, and after a long and determined fight was decided in favor of the importers. In others words, the government's right to levy duty was denied.

Change in the language of the law enacted last year led the government to believe that a decision in harmony with its views might be arrived at by the board. The protestants in the test case just decided are the International Harvester Company and F. P. Flowers & Co. According to the official papers in the case, the patterns are made either of brass or of wood, and were assessed respectively as manufactures of metal at 5 per cent., or as manufacturers of wood of 35 per cent., under the terms of the Aldrich-Payne law. The protestants insisted before the board that the patterns are properly entitled to free entry under paragraph 629.

THE EVOLUTION OF THE MECHANICAL PLATER.

By H. J. Hawkins.*

As I look back on the past, it does not seem long ago that we were experimenting with mechanical platers of different shapes, styles and sizes with, generally speaking, very unsatisfactory results. However, from the beginning, on certain classes of work, very good results have been obtained; but, if we will allow our mind to wander around among old experiences of the past twelve to fifteen years, most men connected with the plating industry could dig up some recollections of their experiences, either pleasant or otherwise, probably otherwise, with mechanical platers. And now and then a man who was far-sighted enough to see the possibilities in the future development of this apparatus, was, perhaps, considered of sound mind and good judgment on all subjects, except his hobby. But as we see the facts as they have developed year after year, we realize that the apparatus, which, a few years ago was considered a fad or, at least, classed as an expensive economy, is now a necessity and a fixed part of the equipment of most plating shops. In fact in some shops next to the dynamo it plays the most important part; and today, after a steady growth and many improvements, covering a period of twelve to fifteen years, we perhaps think this particular branch of the plating art is well nigh perfect. Truly, "The world do move" if we compare results obtainable now with what could be accomplished ten, five, or even two years back; but as a matter of fact this branch of the industry is still in its infancy. There are many, many improvements to be made in equipment, methods and management.

A glance at the current platers' magazines will give one some idea of the rapid strides being made in the manufacture and improvements along this line, to say nothing of the many patents being issued in connection therewith. While all these devices are not perfect and some may not stand the test as to quality and quantity of work produced in a commercial way, (which, after all is the only object in view) yet, with the many inventive minds at work along this line and the considerable amount of time and money that must of a necessity be spent in ideas and improvements and the protection of same by patents, the final outcome can only result in good. By overcoming many imperfections in method and mechanism, which in the next few years should show as decided an improvement over our present day methods, as they are in advance of methods used twelve years ago.

SOME COMMON MISTAKES IN OPERATING MECHANICAL PLATERS.

Solution.—To obtain the best results the solution must be made especially for the plating machine, it matters not whether it is for nickel, copper, brass or zinc. We may, and no doubt many of us do, differ as to what ingredients and proportions thereof any given solution should contain; and we may, also, differ as to the proper specific gravity of the solution best adapted to certain work. All these honest differences as to means and methods, I think, are commendable as they conduce to bring out the best ideas of different minds which will tend to make the final result more nearly perfect, which is as it should be. I believe, though, if we understand the theory of mechanical plating, we will all agree that, if not absolutely necessary, special solutions, anodes, arrangement and methods are highly desirable to facilitate best results. Brass plating, for example; while many mechanical platers are doing brass plating and getting results both as to quality and quantity, yet, this is one of the most difficult problems platers can come in contact with; there are many reasons for this, some of which follow:

If the brass solution is not heavy with metal, no matter how good the color, it will soon become impoverished: if the cylinder is charged with a heavy load of work which will require, say, 150 to 200 amperes at six volts and is run from one hour to one and one-half hours, it can readily be seen that the solution which is small at best will soon be impoverished. Frequently insufficient anodes are used and often a poor quality, which help to develop improper conditions. Insufficient carrying capacity of wiring and improper location of the plater with reference to the still tanks and dynamo, insufficient amperage, also voltage to give best results.

Some platers of my acquaintance who get good results in brass with the mechanical plater and are required to turn out large quantities, never allow their solution to get much below 20 degrees Beaume, preferring to keep it between 20 degrees to 22 degrees Beaume; they use a large anode surface, using the curved type anode, cast of soft yellow brass; in adding metal to the solution it is always carbonate of copper and never zinc. After the solution is once made up, provided sufficient surface of soluble anodes is used, it will not be found necessary to add any zinc, the anodes being capable of taking care of the solution in this particular. The plating machine should be in close proximity to the dynamo and the current should be taken direct from the main buss bars and should not be required to pass through some other tank, especially is this true if the dynamo is small and overworked, which is often the case. You should have available, at least, six volts whether you use it or not, and often it is found desirable to have as much as eight volts, though on most classes of work this is not essential. Slipshod methods of wiring and connecting up the machine is often cause of unsatisfactory results; good connections and wire large enough to carry the current without heating should be used.

PROPER METHODS.

If the solution is kept up to the proper specific gravity by the regular and uniform addition of the proper chemicals it will be found that a greater part of the trouble pertaining to uniform color can be overcome; in connection with this it should be understood that it is very necessary to maintain the solution at a uniform temperature in the winter months; especially is this an important point All other conditions may be nearly perfect for goods results, but if the solution is allowed to become very cold, neither the deposit nor the color will be right. Cast anodes that will curve under the cylinder uniformly should be used, and as these anodes are expected to feed metal into the solution freely, they should be placed in the tank about as close as they can be hung upon the anode pole; it is false economy to be saving with the metal required by this apparatus. The anodes should always be free from oxides when not in use, and will not give good results if allowed to coat badly. In preparing to handle this work arrangements should be made to unload the cylinder and get the work rinsed and dried with the least possible delay.

*Author of "Polishing and Plating of Metals."

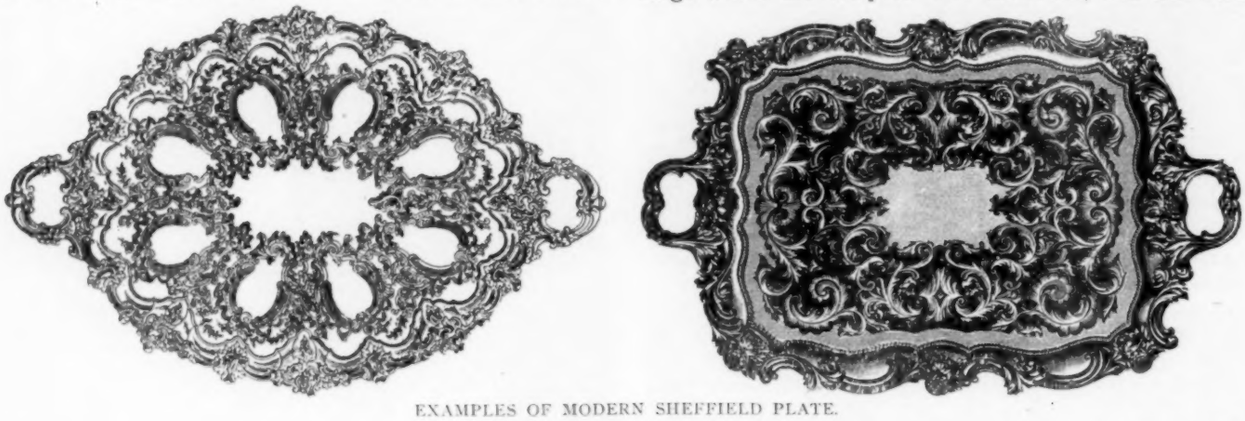
OLD SHEFFIELD PLATE VERSUS MODERN.

By A. F. Saunders.*

Art is craftsmanship plus inspiration, and inspiration is the rush of unconscious memory along channels made by a habit of craftsmanship. The one guiding principle of true craftsmanship is this: the forms used in design should express naturally and simply the properties of the particular material employed.
H. Wilson.

In view of the increasing popularity of so-called Sheffield Plate, this seems an appropriate time and place to compare the original methods of manufacture of that historic and interesting old metal work with those of our modern reproductions. Ever since the practical application of electro-silver plating became possible (about the year 1845) the name Sheffield Plate has been indiscriminately applied to a vast quantity of silver plated ware that little deserved that worthy appellation.

Before going further it seems essential that we should know something of the interesting origin and history of genuine old Sheffield Plate. We, of course, all know that it derived its name and was first made in that famous old English city of cutlery and silverware and in which these industries flourished as far back as the twelfth century. Chaucer wrote of Sheffield "whyttles" (knives) as they were then called; however, it was from the seventeenth to the beginning of the twentieth century that industrial England progressed most rapidly and in no place was this more evident than in the old city of Sheffield. About the year 1742 a new industry was added to the many already practiced in that town, the discovery of plating to take the place of solid silver, this proved of such importance that it greatly helped to place Sheffield among the leading industrial centers of Merrie England.



EXAMPLES OF MODERN SHEFFIELD PLATE.

ORIGIN AND MANUFACTURE OF SHEFFIELD PLATE.

To one Thomas Bolsover the credit for that valuable process is due. This ingenious craftsman while employed repairing a knife handle composed partly of copper and partly of silver conceived the practicability of uniting these two metals in such a way as to form a substitute, to all appearances as good as the solid silver wares, yet, at far less cost. Little realizing the vast possibilities of his discovery he confined himself to the manufacture of small articles, such as tobacco and snuff boxes, but within a few years other skilled workmen of Sheffield took it up with such good results that they successfully imitated the finest and richest embossed plate of the time, indeed equalling in elegance of design the choicest articles of solid silver. So much for its history, now for its process.

A specified quantity of pure copper was put into a melting pot, usually a small amount of brass being added to overcome the extreme flexibility of the copper. When thoroughly fused this metal was then cast into ingots of from two to three inches wide and about two inches thick, the length being regulated by the size of the articles to be made. When cool these ingots were scraped and polished very smooth and clean. Next a sheet of fine silver, a half inch thick and the same width as the copper, this also being perfectly smooth and clean, was applied to the face of the ingot and was held in place by a flat iron plate, the whole securely bound with strong iron wire, thus ensuring their relative positions when put into the heating oven after having the edges of the silver brushed with borax and water. After remaining in the oven or coke fire until the silver was flush around the edge or practically amalgamated to the copper. The ingot was removed with a specially constructed pair of tongs which did not press into the metal, and was then placed in a perfectly level position until set. This whole operation was repeated if both sides of the article to be made required plating, though many pieces, such as dish covers, were plated on one side only, the inner side being flushed over with tin after completion.

The next operation, after this coating of the ingot with fine silver, was to roll it to the required gauge. These sheets then were cut to patterns of the articles to be made. At this stage the solid silver shield used for the engraving of monograms was inserted. This feature is really the best test of genuine old Sheffield Plate. Articles round in form, such as coffee and tea pots, urns, cups or bowls were formed first into tubes, the edges of the metal being brought together dovetailed into each other and silver soldered, then hammered perfectly smooth, again hammered and formed into the shape required. This obtained, the article was again gone over and over, first with the bare hammer, then with a specially shaped hammer, having a steel face strapped to it. The mountings, such as handles, feet and ornaments were then soldered upon the article, which required the greatest care, owing to the fact that many of these stampings were made of very thin silver filled with solder and bent into shape. Before soldering these mounts to the body the points of contact were carefully covered with whiting or loam so that the solder would not run on the silvered surface. The object being carefully heated, the mounts were pressed into place, the heat being kept up to just the right degree that the solder should melt without running.

* Designer Benedick Manufacturing Company, Syracuse, New York.

Next was the addition of the silver edges, these being strips soldered to the body on one side and passing under the mounts on the other side, the article now passed to the chaser, then to the burnisher and finally to the polisher. So well done was the work of these craftsmen that, with few exceptions, the specimens of real Sheffield Plate handed down to us show little evidence of the

SPECIMEN OF OLD SHEFFIELD PLATE.

copper used. It can be seen that the process of manufacture was elaborate and required the most skilled craftsmen, and, while necessarily expensive, it was cheaper than the solid silverwares of the times.

MODERN SHEFFIELD PLATE.

Our reproduction of Sheffield Plate really bears very little relation of the old as far as productive skill is concerned, most of it is now made of German silver, some of Britannia metal and some of copper. It is all electro-silver plated and its mountings are principally of soft metal castings, even the chased and engraved effects are often produced by mechanical means. In design, of course, the original patterns are copied as faithfully as possible; this is really the only redeemable feature of our reproductions as in form and decoration the old Sheffield Plate certainly possessed the charm and aesthetic quality of the best silverware. With few exceptions our modern work lacks that individuality, that incorporation and spirit of skilled craftsmanship which was so predominant in the metal work of those days. While fully appreciating the valuable and really necessary mechanical methods now used in the production of our metal work, we cannot but realize that mechanism largely destroys the intelligent personal efforts of the worker; we therefore can but praise the skill and thorough workmanship incorporated in old Sheffield Plate.

For the benefit of those interested I append a list of the leading makers of Old Sheffield Plate of Sheffield, England, viz.:

Thomas Ellis, John Hoyland & Company, Thomas Law & Company, William Marsden, Thomas Morton, I. Rowbottom & Company, Tudor & Leader, Thomas Banbury, Joseph Kirk.

KINKS FOR PATTERNMAKERS' AND PATTERN SHOPS.

By W. H. Parry.*

For the benefit of the "tryo," and, perhaps, some of the old bucks of the trade, let me sing a song of past performances that has helped me many times over the rocky roads and deep pitfalls that have beset an unfortunate patternmaker in a career extending over some three hundred and sixty moons. Double-pointed tacks, such as are used to secure carpets to floors make excellent pinch dogs for small work by shortening the points and filling "draft" on inside. A package can be bought for ten cents and they will last for years. Every now and then we see in the technical journals fearful and wonderful designs of drawers for holding brads and screws, and we have yet to see anything that will compare with the tinned muffin pans that can be bought for ten cents apiece, with a dozen pockets for as many kinds of screws or nails of two inches in length or under, by nailing a couple of strips on each side of these pans and providing suitable ways. They make the ideal drawer.

Clothes pins, both the "ten for a cent" and "one for a cent" kind are handy things to have around when glueing up thin stock, especially the spring clothes pin or the "one for a cent" kind, as their adaptability and gripping powers are phenomenal on stock of three-eights of an inch or under. It would pay patternmakers to include some of these "clamps" among their kits. Metal dowel pins are all right for patterns until the molder drives his golf stick or rapping bar in the female or gently taps the sides of the male pin with the same unholy weapon. These little operations of the molder simply puts the metal dowels, such as are on the market at present, out of business. There are two ways of beating the molder at this game, and they are both good. One is to make very large wood dowels if the design permits, and by large, I mean anything over one and one-quarter inches and up to two inches in diameter, or, if the design is such that small dowels must be used, then make the metal dowels this way: Use a button head steel or brass screw for the male dowel and a piece of brass tube stock slightly larger in diameter than the head of the screw for the female, place same in the drill chuck and turn out a hemi-spheroidical shaped space somewhat deeper than the head of the screw but fitting fairly snug, locate positions of dowels in pattern, drive females in one-half and screw males in the other; if there is a shake or a bind a quarter turn of the screwdriver one way or the other on one of the male pins will fix matters. This type of dowel may or may not be new, but it is certainly new to me.

On a hurry up job where pattern letters of figures are a part of the design, use shellac as of old, but after placing and spacing properly use heat either from a soldering iron, lamp or match to evaporate some of the rum quickly, and in five minutes the job is ready for the foundry men.

A TON OF PLATINUM.

It is an interesting fact, perhaps not generally known by operating telephone men, that precious metals such as platinum, gold and silver, and even precious stones such as diamonds, are used extensively in the manufacture of telephone apparatus. The Western Electric Company, the largest manufacturer of telephones in the world, uses upwards of one ton of platinum each year.

* Superintendent National Meter Company, Brooklyn, N. Y.

PHYSICAL AND CHEMICAL TESTS OF SOME ACID-RESISTING ALLOYS.

SOME INTERESTING DATA REGARDING THE USE OF LEAD, ANTIMONY AND NICKEL ALLOYS.

BY ANDREW M. FAIRLIE.*

The material in most common use for the construction of apparatus and plant equipment which must come into contact with sulphuric acid or its fumes, is lead. Where the apparatus comes into contact with weak acid, it is the only material cheap enough, and offering enough resistance to the action of the acid, to be of practical use. Strong sulphuric acid (60 deg. B. and over) may be safely conveyed in iron pipes, and acid of such strength may also be stored in iron tanks, provided they are kept closely covered. If open, however, the tanks must be of lead, even for strong acid, because such acid speedily absorbs some moisture from the atmosphere, rendering the surface layer weak enough to exert a corrosive action on iron.

For certain purposes, lead is objectionable on account of its softness and low tensile strength. The plugs and seats of lead-lined tanks, for example, and the seats and plungers of acid valves, must be made of an acid-resisting metal harder than lead, in order to

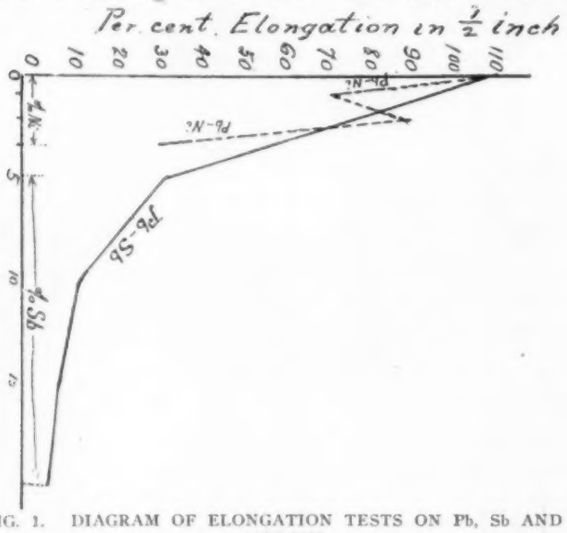


FIG. 1. DIAGRAM OF ELONGATION TESTS ON Pb, Sb AND Ni ALLOYS.

retain their shape in service and avoid leakage. For the construction of the moving parts of acid plant machinery, such as gas fans or acid pumps, material stronger than lead must be used to maintain the integrity of the machine.

PHYSICAL AND CHEMICAL TESTS OF PURE LEAD, AND OF LEAD-ANTIMONY AND LEAD-NICKEL ALLOYS.

Composition of Test Piece.	Elongation in ½ inch. Per Ct.[1]	Tensile Strength per sq. in. Lbs.[1]	Effect of Sulphuric Acid. 50 deg. Acid. Cold. Loss in Weight. Per Ct.[2]	50 deg. Acid. Hot. Loss in Weight. Per Ct.[3]	62 deg. Acid. Cold. Loss in Weight. Per Ct.[4]	62 deg. Acid. Hot. Loss in Weight. Per Ct.[5]
Pb, 100%.....	110.0	2,365	0.014	0.357	0.078	0.419
Pb, 95%; Sb, 5%...	34.0	6,393	0.015	2.533	0.036	3.598
Pb, 90%; Sb, 10%..	13.0	7,673	0.017	1.598	0.039	4.344
Pb, 85%; Sb, 15%..	8.0	7,212	0.024	0.872	0.058	3.126
Pb, 80%; Sb, 20%..	5.0	5,538	0.015	2.425	0.091	5.817
Pb, 99%; Ni, 1%...	74.0	3,174	0.009	0.190	0.035	0.391
Pb, 97¾; Ni, 2¼%.	91.0	3,262	0.017	0.085	0.042	0.357
Pb, 96½; Ni, 3½%.	32.0	3,262	0.021	0.134	0.057	0.199

The physical tests whose results are given in the above table, were made with a view to determining the strength and ductility of alloys harder than lead, and the chemical tests were made to ascertain to what extent acid-resisting properties were sacrificed to gain strength and hardness. Samples of pure lead were included in the tests for the sake of comparison.

These results are presented graphically in the accompanying diagrams (Figs. 1, 2, 3, 4).

It will be noted that the strongest alloy, that containing 10 per cent. of antimony, is more than three times as strong and less than ⅛ as ductile, as pure lead,

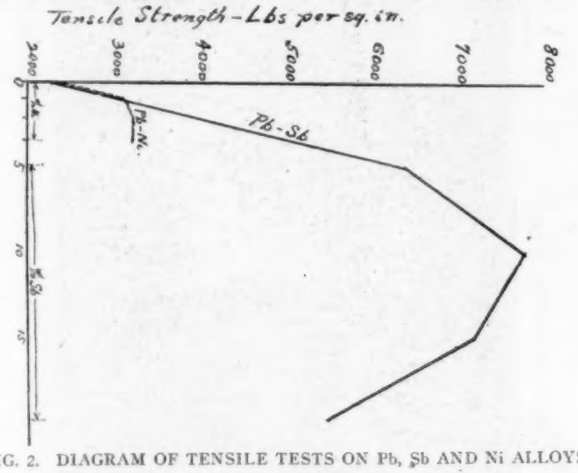


FIG. 2. DIAGRAM OF TENSILE TESTS ON Pb, Sb AND Ni ALLOYS.

and yet offers as much resistance to the action of cold acid, either weak or strong, as lead itself. It is only in contact with hot acid that this alloy displays its deficiency in acid-resisting qualities, and then, indeed, this deficiency becomes quite serious. Even in the

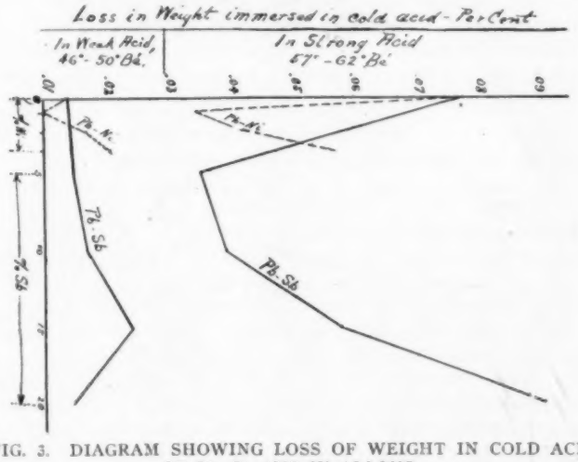


FIG. 3. DIAGRAM SHOWING LOSS OF WEIGHT IN COLD ACID OF Pb, Sb AND Ni ALLOYS.

presence of hot acid, however, it is almost the equal of any other lead-antimony alloy, whilst the others are decidedly inferior in tensile strength. All in all, therefore, the 10 per cent. alloy is considered the best

*Tennessee Copper Company, Copper Hill, Tenn.

[1]Each figure in this column is the mean of two tests.

[2]Time exposed to cold acid, one week. Density of acid at end of test, 46 degs. Be.

[3]Time exposed to hot acid, 12 hours. Temperature of acid, 184 degs. C. Density of acid at end of test, 62 degs. Be.

[4]Time exposed to cold acid, one week. Density of acid at end of test, 57 degs. Be.

[5]Time exposed to hot acid, 12 hours. Temperature of acid, 184 degs. C. Density of acid at end of test, 64 degs. Be.

of the antimony mixtures. The nickel alloys present acid-resisting properties superior in nearly all cases to that of pure lead. They have, moreover, a tensile strength one-third greater than that of lead, although less than half that of the best antimony alloys. On account of the wide difference between the melting points of nickel and lead, these alloys containing small

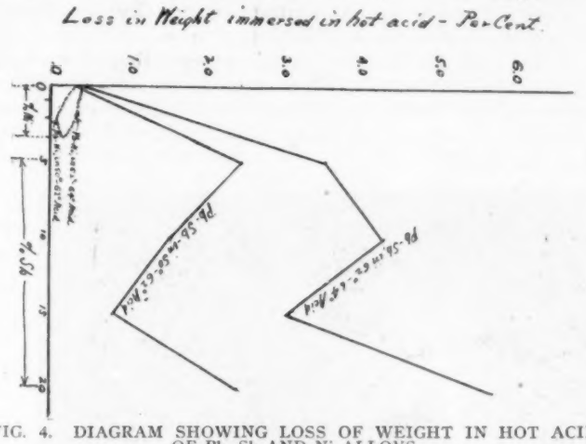


FIG. 4. DIAGRAM SHOWING LOSS OF WEIGHT IN HOT ACID OF Pb. Sb AND Ni ALLOYS.

percentages of nickel are not easy to make. The lead-nickel alloy is, however, a possible substitute for lead-antimony in cases where hot acid has to be dealt with, provided a moderate degree of hardness and strength is all that is required.

WATCHES AND WATCH TRADE IN SWITZERLAND.

FROM UNITED STATES CONSUL-GENERAL R. E. MANSFIELD, ZURICH.

According to the annual report of the Swiss Association of Watch Manufacturers the exports of watches and watch parts from Switzerland were as follows in 1909:

Description.	Number.	Value.
Watches	8,075,379	$20,465,208
Watch movements	883,731	1,108,405
Cases	1,831,409	1,155,518
Detached pieces of watches	.....	399,174
Sections of finished watches	.....	1,126,579
Total	.....	$24,254,884

The number of finished watches exported in 1909 was 341,523 in excess of those exported in 1908, but their value was $811,175 less. The year 1909 marked the end of the crisis which so seriously affected the business for several years, and it is the opinion of the manufacturers that the industry has entered upon a period of general activity.

EXPORTS BY CLASSES AND COUNTRIES.

The values of nickel and gun-metal watches exported were extraordinarily low, and the value of silver watches varied greatly, gold watches only having remained stable, but the per cent. of gold watches to the total exports is comparatively small. The proportional per cent. in the value of the different classes of watches exported last year was: Nickel and gun metal, 59; silver, 30; gold, 11.

UNITED STATES TREASURY DEPARTMENT DECISIONS.

DRAWBACK ON LEAD SHEETS.

James F. Curtis, Assistant Secretary of the Treasury Department, allows a drawback on soft sheet lead and Hoyt metal sheet manufactured by the Hoyt Metal Company, of St. Louis, Mo., with the use of imported lead bullion and antimonial lead. He says:

"In liquidation, the quantities of imported lead which may be taken as the bases for the allowance of drawback may equal the quantities claimed in the drawback entry after official verification of exported quantities and analyses, provided such allowance shall not exceed the actual quantity of lead appearing in the exported sheets, no allowance being made for wastage."

BRONZE CASTINGS NOT STATUARY.

Adverse action has been taken by the United States Board of General Appraisers on protests filed by O. G. Hempstead & Sons and others. The merchandise consists of cast bronze busts and imitation bronze figures composed of zinc. Duty was assessed at 45 per cent. under the provision in the Dingley tariff for manufactures of metal. The importers' claim was that the articles should be allowed to enter as "statuary" at the rate of 15 per cent. ad valorem. Judge White states in his decision overruling the protests that, according to the report submitted by the local appraiser, the articles are not "wrought by hand" according to the sense of that term as used in the law, and hence are dutiable properly as assessed as commercial bronzes under the provision for "manufactures of metal."

LESS DUTY ON POWDER BOXES.

APPRAISERS' BOARD ADMITS GUN METAL VARIETY AT 50 PER CENT.

The H. B. Claflin Co. has been successful before the board of appraisers in securing a reduction in duty on gun metal powder boxes carried in women's hand bags. Collector Loeb assessed the articles at the rate of 85 per cent. under the provision in the present tariff act for "articles of gun metal to be carried by the person."

Appraiser Wannamaker made a report to the collector in which he upholds the contention of the importers for an assessment of only 50 per cent. under the tariff provision for fitted leather bags as specified in paragraph 452, act of 1909. The local appraiser's report, which appears to have influenced the decison of General Appraiser McClelland, says:

"This protest refers to items marked 'X,' consisting of gun metal powder boxes to be carried in ladies' hand bags. Return for duty was made at 85 per cent. ad valorem under the provison in paragraph 448, tariff act of 1909, for articles of gun metal to be carried by the person. These boxes, together with the mirrors, are in fact fittings for the leather bags covered by this invoice, and it is now the opinion of this office that return should have been made on all at 50 per cent. ad valorem under the provision for fitted leather bags in paragraph 452."

The board sustains the claim for duty at the rate of 50 per cent. The collector is directed to make a reliquidation of the duties on this basis.

BELGIAN GOVERNMENT ADOPTS METRIC SYSTEM.

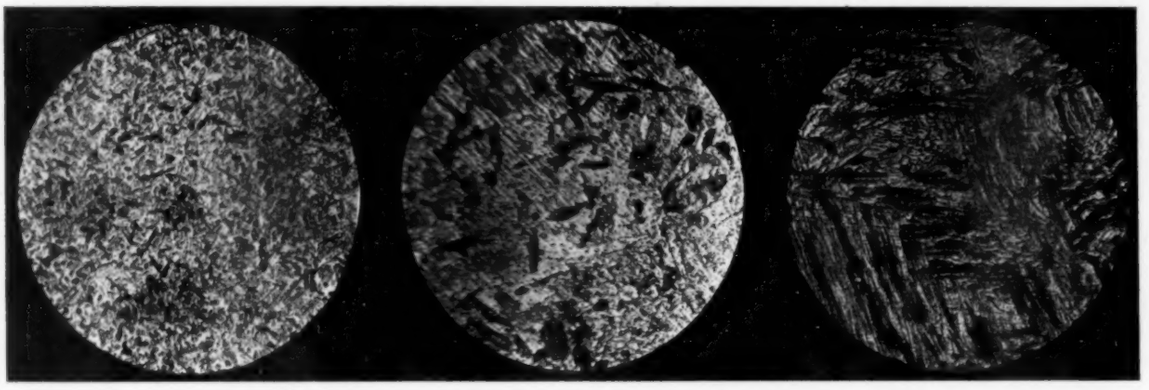
American Minister U. Grant Smith sends from Brussels the recent decree of the Belgian Government, which makes the use of the metric system of weights and measures obligatory for all public documents, notices, and advertisements, and for all papers, public or private, produced before a court, notary, or other public official. The use of any other standard, except the marine knot and ton and in dealings with foreign countries, is made punishable by a maximum fine of 50 francs ($9.65), and the confiscation of the weights and measures which may be used.

THE MICROSCOPE AND THE BRASS FOUNDRY.

SOME OF THE ADVANTAGES TO BE DERIVED FROM ITS USE IN MANUFACTURING BRASS AND BRONZE.

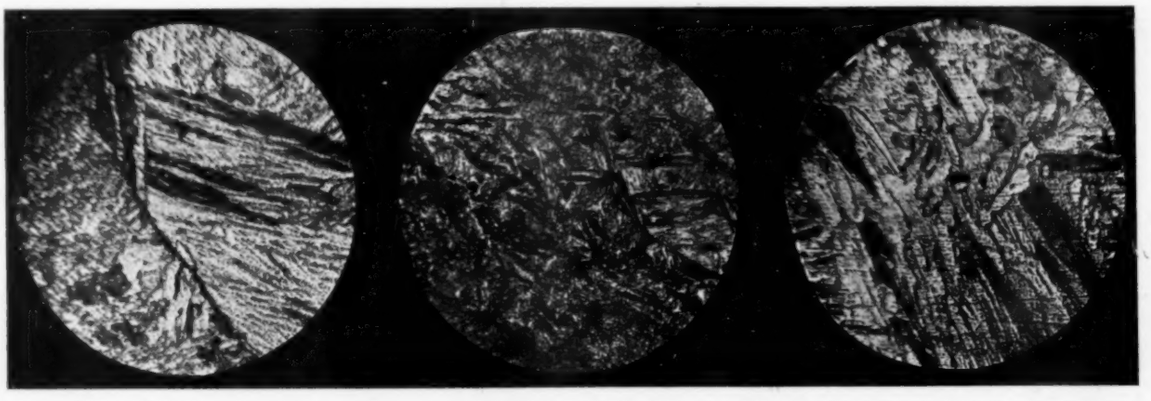
BY CHARLES T. BRAGG.*

The chemist with his laboratory has done a great deal in the quite recent past towards standardizing and systematizing the manufacture of non-ferrous alloys. Certainly he has not done this by simply analyzing samples, but more exactly he has co-ordinated his results with the condition of affairs which have made his results necessary, and thus to a very large degree has made the manufacture of brass and bronze less and less of a speculation. By determining the quality of his raw materials and insisting, by issuing purchasing specifications, upon receiving this quality, he has been enabled to largely predetermine the physical characteristics of his alloys. Once assured of his compositions and their uniformity, the testing machine has served to relate the system of production controlled by analysis to desired strengths and characteristics.



THE FIRST TWO OF THESE PICTURES SHOW MANGANESE BRONZE WITH 1.04 PER CENT. IRON. THE THIRD IS A CORRESPONDING BRASS CONTAINING IRON BUT WITH NO MANGANESE.

However, it is well known that the testing machine and chemical analysis, pure and simple, cannot produce always just what is desired, nor can they always determine just why they cannot produce all that is desired. In the last few years, and more and more every day, they are being enabled to call to their aid the microscope, which shows in many instances the relationship of cause to effect. While admittedly it cannot quantitatively show anything, it often does give the impression of quantities sufficiently accurately to allow of correction or treatment of the material upon which it is being used in a logical and scientific manner. The objection has been raised by some that the metallurgical microscope is an instrument belonging to the chemist and is to be classed with his other somewhat mysterious apparatus and chemicals. While it is true that long study and considerable experience is necessary before the real underlying principles of brass and bronze structures can be understood, there are, nevertheless many simple, though important details of structure and evidences of brass diseases that can be seen and afterward recognized by any foundryman after they are once pointed out to him. For example, large crystals of either brass or bronze generally tend toward weakness and certainly after seeing several samples of different brasses or bronzes, or several pieces of the same sample whose heat treatment has been different, the foundryman will be able to distinguish the large from the small crystals at low powers, of course, and thus find for himself something about the temperature at which, for any given material, he would get the strongest alloy for the particular mixtures with which he is working. No knowledge of some of the deeper rudimentary principles of alloy structure, to be mentioned later, would be necessary to accomplish what has just been mentioned.



THE FIRST PHOTO IS OF BRASS WITH 1.04 PER CENT. IRON BUT NO MANGANESE. THE LAST TWO SHOW THE SAME COMPOSITION AS THE FIRST BUT WITHOUT IRON AND MANGANESE.

*Chemical Engineer, Ohio Brass Company, Mansfield, Ohio.

Brass and bronze structures have been but little studied, but there is every reason to believe from what little work has been done, that the heat treatment of non-ferrous alloys is just as important as the heat treatment of steel. It is entirely possible and predicted to be probable, that within the next few years brass foundries will be heat treating some of their castings just as steel is being treated today, and there is no reason to doubt that just as wonderful results will be attained as have been attained in steel. Certainly the critical points in brasses and bronzes are not as marked nor as regular as those of steel, nor are they influenced by so minute changes in composition as is steel, but they can, nevertheless, be located.

The presence of oxides, both in alloys, and more especially, in copper, as well as the presence of uncombined lead, are easily detected with the microscope. Then, too, as before mentioned, crystalline structures can be easily distinguished, giving in a general way the physical property to be expected. No attempt will be made here to go into the question of solid solutions, eutectics, nor metallographical nomenclature, as the simpler phases only of the use of the microscope are under consideration. Generally speaking, the first requisite of successful work in metallography is a first class microscope. The metallographical microscope is different from the ordinary microscope in that the light is not reflected up through the specimen under examination, but is thrown down through the objective or lower lenses of the microscope onto the object. Consequently in buying a microscope, care should be taken to specify that it is for metallographical work. Another thing of importance is that metallographical work, is best done without the use of a cover glass. Consequently, the objectives for the microscope should be bought calibrated for use without a cover glass.

The six photographs accompanying this article will serve to illustrate, however, the use to which the photographs can be put. Numbers one and two are samples of manganese bronze containing 1.04 per cent. iron. Number one magnifies 65 diameters and number two, 190 diameters. Photographs three and four are specimens of the same brass containing equivalent quantities of iron made without the use of manganese, while photographs five and six are the same composition as one, two, three, and four, except that neither iron nor manganese has been used. The effect of the manganese is apparent throughout. Numbers one and two show a much finer structure than either the other four, but the effect of the iron is not noticeable in any case. This point is noted as an example of one of the things yet to be studied, i. e., the structural effect of iron on manganese bronze.

(To be continued.)

THE MANUFACTURE OF WROUGHT BRASS

A Description of Modern Methods for the Production of Plate, Sheet, Rod, Wire and Tube.

(Continued from December.)

By L. J. Krom.

ROLLING THE METAL.

"Breaking" down orders run as follows:

All common and drawing brass bars are 1⅛ ins. thick and are to be rolled:

First pass roll to ⅞ inch exact.
Second " " " ¾ " scant.
Third " " " ⅝ " "

From the above memoranda it will be seen that it is possible for mills to adopt certain set rules for rolling certain classes of metals. Once get the standard system in force and everything moves smoothly, and it is only the special mixtures that tax the judgment and skill of the rollers in order to reduce the metal in the quickest possible time and with a minimum of loss.

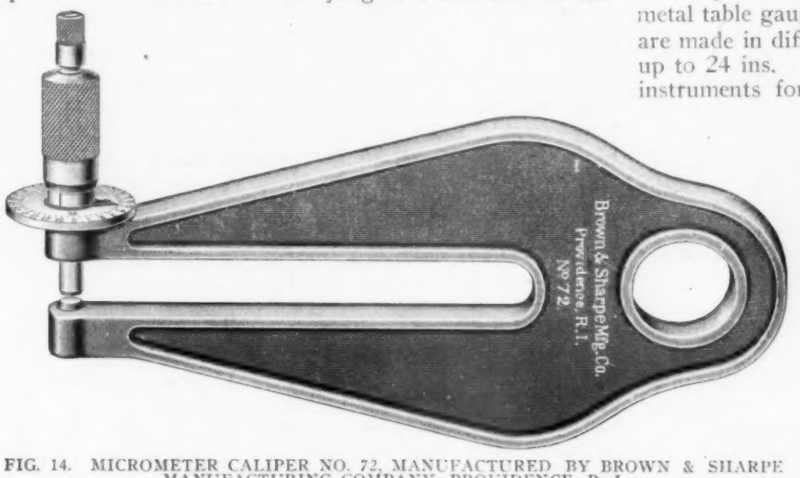


FIG. 14. MICROMETER CALIPER NO. 72, MANUFACTURED BY BROWN & SHARPE MANUFACTURING COMPANY, PROVIDENCE, R. I.

GAUGING THE METAL.

The thickness of the metal as it is rolled is measured or gauged by the Brown & Sharp gauge or standard. This gauge runs by numbers, each number corresponding to fractions of an inch and millimeters or the decimal part of a meter. General practice demands the use of the numbered scale, as No. O gauge is .325 in., with the nearest millimeter gauge of 8.251. The list runs on up to and beyond No. 42, which is .0025 in. and .0632 millimeter. The gauges most generally used are the micrometer calipers as shown in Figs. 14 and 16, and the sheet metal table gauge shown in Fig. 15. Micrometer calipers are made in different styles and sizes to measure all sizes up to 24 ins. They form most convenient and accurate instruments for fine external measurements. They are graduated to read to thousandths of an inch, and half and quarter thousandths are readily estimated.

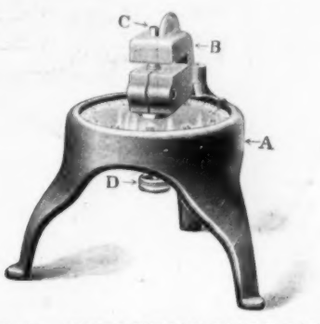


FIG. 15. SHEET METAL TABLE GAUGE.

The table sheet metal gauge shown in Fig. 15 will measure from one to four inches by thousandths of an inch, and is generally used by sheet metal workers and rollers, silversmiths and jewelers, rubber and paper manufacturers, etc.

The frame A is of cast iron, japanned, and supports the measuring mechanism. The arm B is fastened to the frame and holds the measuring screw D and the adjusting screw C. The knurled thumb screw D is for operating the measuring screw and the movable dial. The movable dial is of German silver and the graduations are read by means of the pointer shown at the right of ram B. Provision is made for compensation for wear.

The Micrometer Caliper shown in Fig. 16 is new in design and is found well adapted to sheet metal workers' use. The gauge screw is encased and protected from dirt and injury. Means of adjustment are provided to compensate for wear. The opening in the frame is about 4¾ ins. deep; a feature much appreciated, as it enables sheet metal to be more accurately

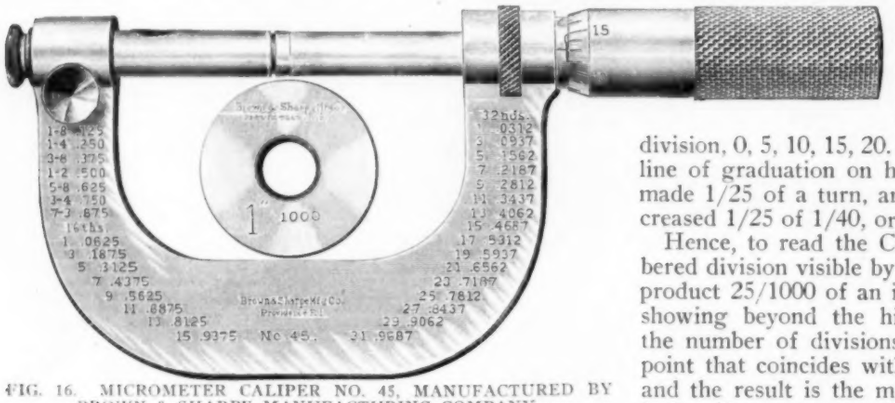


FIG. 16. MICROMETER CALIPER NO. 45, MANUFACTURED BY BROWN & SHARPE MANUFACTURING COMPANY, PROVIDENCE, R. I.

measured than would be possible with an ordinary micrometer. To facilitate the reading of the caliper the thousandths readings, usually taken from the thimble, are taken from a dial, graduated into 25 equal parts; and by means of the pointer, readings can easily be made to one-half thousandths. For convenience in reading, the barrel is graduated on opposite sides. Each caliper is provided with a ratchet stop, that enables measurements to be quickly and accurately made.

FIG. 17. MICROMETER CALIPER NO. 47, MANUFACTURED BY BROWN & SHARPE MANUFACTURING COMPANY, PROVIDENCE, R. I.

The micrometer caliper shown in Fig. 17, about one-half size, is also new in design.

The clamp screw, not shown in cut, clamps the spindle and preserves the setting.

The chief mechanical principle embodied in its construction is that of a screw free to move in a fixed nut. An opening, to receive the work, is afforded by the backward movement of the screw and the size of the opening is indicated to thousandths of an inch.

In this caliper, the gauge or measuring screw is cut on the concealed part of the spindle, and moves in the thread tapped in the hub. The hollow sleeve or thimble is attached to the spindle and covers and protects the gauge screw. By turning the sleeve, the screw is drawn back and the caliper opened.

The pitch of the screw is 40 to the inch. The graduation of the hub A, in a line parallel to the axis of the screw, is 40 to the inch, and is figured 0, 1, 2, etc., every fourth division. As the graduation conforms to the pitch of the screw, each division equals the longitudinal distance traversed by the screw in one complete rotation, and shows that the caliper has been opened 1/40 or 25/1000 of an inch; therefore for every figured division the caliper has been opened 4/40 or 100/1000 of an inch. The beveled edge of the sleeve is graduated into 25 parts, and figured every fifth division, 0, 5, 10, 15, 20. Each division, when passing the line of graduation on hub, indicates that the screw has made 1/25 of a turn, and the opening of the caliper increased 1/25 of 1/40, or 1/1000 of an inch.

Hence, to read the Caliper multiply the highest numbered division visible by 100/1000 of an inch; add to this product 25/1000 of an inch for every additional division showing beyond the highest numbered one; then add the number of divisions on the sleeve from zero to the point that coincides with the horizontal line on the hub, and the result is the measurement in thousandths of an inch. For example: Suppose when a measurement is taken the highest number division visible is 2 and beyond this there are 3 additional divisions visible on the hub, and the 15th division on the sleeve coincides with the horizontal line on the hub; then ($2 \times 100/1000 = 200/1000$) + ($25/1000 \times 3 = 75/1000$) + $15/1000 = 290/1000$ of an inch, or $200/1000 + 75/1000 + 15/1000 = 290/1000$ of an inch.

After the brass has been rolled to the last reduction called for, it is known as "finished" as far as the rolling operations are concerned. If the mill order calls for soft metal or "blued finish" it is sent to the muffles after the last pass through the rolls and given a "light anneal." This means heated to a dull cherry red or upwards of from 400 to 500 degs. Fahr. in a majority of cases, for ordinary brass mixtures. Low brass and bronze mixtures can stand considerably higher temperature, but in general the figures given will be found sufficient.

After the brass has been annealed it undergoes a last pickling operation which prepares it for the subsequent finishing processes. If the metal is to be finished at the rolls "hard," the order generally specifies "Finish X Numbers hard." This means that the brass shall be repeatedly whatever reductions may be required without annealing. So for instance, the order may say 4 numbers hard, so that a coil of brass would be rolled from say number 26 to number 30 and left at that gage as finished. This is true generally of all leaded mixtures, most all of the ordinary drawing—tubing, and spinning brass mixtures are "finished soft."

(To be continued.)

REORGANIZATION.

Some Practical Suggestions for Economic Progressive Production of Metal Goods.

By Ernest A. Lewis.*

In these days of keen competition it is necessary for manufacturers to put their works on the best modern basis as regards plant and methods. There is a right and a wrong way of doing this. It must be borne in mind that copper and brass have altogether different properties from iron and steel, and modern machinery and furnaces which suit the latter metals are often unsuitable for copper and brass. In some old mills the arrangements are often bad; there is no system, a pickling shop or annealing furnace is put anywhere wherever there is room. A badly arranged works causes loss in various indirect ways. There is additional labor required to move the semi-finished and finished products to the next process.

In a well-arranged mill it should be possible to receive raw material in at one end and pack the finished goods at an opposite end. It may not be practicable to have this end diametrically opposite; in fact, the shipping warehouse might be next door to the raw material warehouse. So long as it can be worked in line with the minimum of labor it does not matter much where the end of the process is. Railway and canal facilities have to be taken into account. As examples, in a hot-rolled sheet mill it should be possible to take the copper, spelter and scrap direct from the warehouse into the casting shop, from there to the breaking-down furnace, then on to the finishing rolls, annealing furnaces, pickling shops, and finally the packing shop. The furnaces arranged as far as possible on one side and the rolls opposite. The coal or fuel entering and the ashes going out on one side right away from the metal. The gangways should be as wide as possible.

In a sand-casting shop the metal warehouse should be close to the furnaces and the castings work right through to the fettling benches and sand-blast apparatus. The buildings should be lofty, especially the casting shops, which should be well ventilated, but due regard must be paid to the necessity of avoiding direct draft on the metal when pouring. Large doors and side ventilators which can be easily opened and shut are best, so that all can be closed immediately before pouring and opened when it is finished. In a lofty shop an open roof ventilator along the top of the shop, combined with large doors and side ventilators, will quickly remove any fumes of zinc oxide. In England the factory inspectors have power to compel efficient ventilation, and it is an offense to allow food to be eaten within a certain time of pouring. It cannot be too strongly impressed upon the men that the fumes are poisonous and, in my opinion, no food should ever be eaten in a casting shop, not alone cooking meat on a handful of redhot charcoal, fetched out of the pouring ladle for the purpose, as I have seen on more than one occasion. Alcoholic liquors intensify the ill-effect of the fumes.

Hot rolling mills should not be too light, as it is impossible to judge the heat of the metal in a well-lighted mill. With regard to power, there is not much doubt that electrical driving will supersede all other kinds in many mills. It would not pay a small mill to make its own electrical power, and unless it could be bought from a town supply the steam engine must be used, that is, assuming no water power is available. It is rather remarkable that for heavy rolling mills one of the most economical types is the beam engine. It is for an engineer to advise as to the best type of engine or electromotor to adopt; it varies with circumstances.

* Consulting Metallurgist, Birmingham, England.

TYPES OF MELTING AND ANNEALING FURNACES.

A glance through the advertising pages of The Metal Industry will show a variety of furnaces for different purposes. There is not much doubt that the old pot furnace will become obsolete except in very small shops. Of the various types of furnaces used for melting at the present time electrical smelting need not be considered as practical in the copper and brass trade. Of the various gas furnaces those fired with producer gas on a similar principle to steel crucible regenerative gas-fired furnaces are unsuitable for melting brass; the heat is far too high. Gas-fired furnaces for muffles and annealers are practicable only if at least six to eight furnaces are coupled up to two producers. It is very difficult to work three or four furnaces from one gas producer, whereas two producers will balance one another. I speak from practical experience on this point.

There are good furnaces on the market now which anneal in steam and prevent scaling, thus no pickling is required. They are worthy of the serious attention of manufacturers looking out for an economical annealing furnace. Of modern crucible furnaces there are many; some of them have obtained a bad reputation, but I think this is due to improper working. Some makers ask exorbitant prices for them, out of all proportion to the economies they effect. It is a well-known fact that the best metal is always obtained by melting in pots. Before installing any new furnaces a written guarantee should be obtained from the makers stating the amount of fuel per ton of metal melted the furnace will burn, starting all cold, the average life of the pot, also of the inner lining. A maker of a good furnace will not hesitate to guarantee these particulars. All modern reheating furnaces for brass and copper sheets are of the enclosed type; that is, the flame does not touch the metal.

While deciding on reorganization it is well to review the metals used and standardize every mixture used and keep to these standard mixtures as far as possible by means of chemical analysis. A research metallurgist can be usefully employed in all large works experimenting on alloys and finding out their properties and reducing the percentage of copper to the smallest practical limit for all work, except where a guaranteed percentage has to be supplied. I have often come across cases where 3 per cent. or 4 per cent. more copper has been put in brass than was necessary to get an alloy with certain desired properties. The indiscriminate use of scrap is to be avoided.

It is often asked what advantage a metallurgist, as distinct from an analyst, is to a works. In the first place, a metallurgist is a skilled analyst and can look after the routine laboratory chemist; he can advise customers as to the best metals to use for special purposes; can find out faults and how to avoid them. A metallurgist cannot directly be of any money advantage to a works, like a caster or roller, but indirectly he is of great advantage and can save his salary many times over. A competent metallurgist can take charge of the brass foundry, refinery and take general supervision of the treatment of metals.

While on the subject of "Reorganization" we may mention other things that works may be losing money upon—small items, probably, but they help to increase expenses. Fuel is one. Large quantities of coal are used in a big mill. It will pay to carefully sample and test the coal used. Note the following points: the percentage of moisture, the percentage of ash, the calorific value and

the price per ton. Add the percentage of ash and moisture together and see how much valueless material you are buying. Of course, you must buy some moisture and some ash, but the total of each should not be above 12 per cent. with fairly good coal, i. e., 7 per cent. for ash and 5 per cent. for moisture. I have known coals to contain 10 per cent. to 15 per cent. moisture and 15 per cent. to 20 per cent. ash. The loss is not only by paying for unburnable material but there is the extra cost of ash wheeling and removing rubbish for each percentage of ash over the normal quantity. A certain amount of unburned carbonaceous matter is always lost with the ash. It follows that the more ash there is the more loss of unburned coal. Some of this may be recovered as "breeze" and used for blacksmiths' fires, etc., but the loss is great.

Coke is another item. It contains more ash than coal; in fact, nearly double, as it is coal which has lost from 30 per cent. to 50 per cent. volatile matter. The clinker causes the insides of the furnaces to wear out quicker, also the bottoms of the pots. Coke may be hard, medium or soft. The latter is not satisfactory to a brassfounder; a medium coke is the best. Hard coke is very necessary for steel makers, but not for brassfounders. In a large mill using steam power another item occurs, water for steam raising. If it has a comparatively soft water under 12 degrees of hardness, it is unnecessary to soften it. If it has a hardness of 20 degs. to 40 degs., it is as well to see how many gallons is used per annum; how much a year it costs to clean the boilers; the thickness of scale formed, and if a system of softening the supply would not be economical. The best means of softening vary with different waters, but it is outside the scope of this article.

Oils and greases are a fairly considerable item in large works; they should be looked into—the cost per gallon; the quantity necessary per week or month to lubricate certain machines; will a cheaper oil do the same work just as efficiently? These things can only be found out by actual trial. Cheapness in oil for tube drawing is not always economy. A dearer oil may draw twice as many tubes of the same size as a cheaper oil; for example, an oil at 1s. 6d. per gallon may be sufficient for double the number of tubes as an oil at 1s. per gallon. The dearer oil is often the cheapest in the long run. A great deal of oil may be recovered, filtered through an oil filter and used over again.

The cost of labor and steam for the filter is very small and the oil recovered is practically as good as new. Greasy waste can be heated up with a steam coil, put through a pair of hand rolls and the bulk of the oil extracted and filtered. The waste, if free from borings and foreign matter, can be cleaned by boiling up in strong soap solution, well rinsing in clean hot water, then dried in the air and used again. I believe petroleum light oil is used for this purpose, but it is very dangerous owing to its inflammability.

It is by careful scrutiny as to cost of comparatively insignificant matters that economies can be effected. THE METAL INDUSTRY (July, 1910) has recently published an article on the advantages of selling large quantities of residuals on the assay value, but residuals must be reduced as much as possible. The indiscriminate sweeping up of clean borings and odd pieces of brass, putting it on one side as sweeps for sale, is bad management.

Figuratively speaking, every particle of clean metal should eventually go back to the casting shop. The larger pieces and dirty borings (free from iron) should be accumulated until two or three tons or more can be melted down in a reverberatory furnace, along with clean skimmings, and made into ingots. Brass ashes can be picked over and the half-burned coke returned to the furnaces. This increases the percentage of copper in the ashes and an higher price can be obtained for them. The maximum amount of copper in any slag or dirt thrown away should not exceed 0.5 per cent. in a well-managed works; it is often less. Method and order should be the rule in every department of a modern brass and copper mill or brass foundry.

GERMAN BRIQUETS FROM SHOP WASTE.

(From United States Consul-General A. M. Thackara, Berlin.)

A Chicago investigator desires information regarding the process of high-pressure briquetting operations in Berlin for making briquets of shop wastes.

The process of a certain company is that of the Ronay system, which is patented in all civilized countries. It is used in about ten foundries and machine factories in Germany and by several firms in Austria and England. The principal use to which this system has been put is the briquetting of iron ores and the metal wastes of foundries and machine shops.

The owners of the process claim that it can also be profitably employed in briquetting coal and peat, furnace soot, charcoal dust, and sawdust for fuel purposes, in briquetting bronze, copper, and brass scrap to be remelted, and in briquetting salt, rice, corn, and other kinds of meal and bran for stock feed when it is desired to bring these products into as compact form as possible. The high-pressure briquetting company referred to has the sale or disposal of all licenses or royalties for briquetting iron and metal waste, and another company the licenses and royalties for other briquetting purposes.

EQUIPMENT AND OPERATIONS.

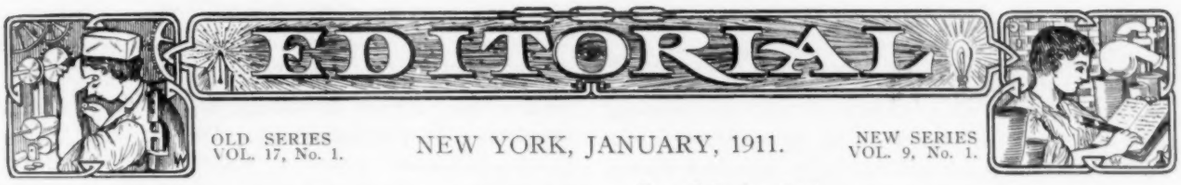
The briquetting plant consists of a simple hydraulic press of massive construction. The briquet molds are of various sizes and may be either round or rectangular in shape. The material is weighed and placed in molds automatically, and after being briquetted is removed automatically. No binder of any kind is used, the secret of the process being to apply a very high pressure in such a manner as to insure a uniform consistency in every part of the briquet and to expel all air from the material forming the briquet. If the air is not completely expelled or if homogeneity is not obtained, the briquets are apt to disintegrate before fusion when placed in the furnace.

A Chemnitz metal works make a business of briquetting metal turnings and other metal waste for machine factories and foundries in that section. The shop wastes are shipped to the briquetting plant and returned in the form of briquets. The rates charged per ton range from $4.75 to $6 for cast iron turnings, $6 to $7.15 for steel, and $12 to $16.50 for bronze, copper, and brass turnings. According to information furnished by the inventor of the process, the total running expenses, not including the cost of the royalty or license, for a plant having an annual capacity of 10,000 to 15,000 tons would amount to about $1.20 per ton of briquets.

CHILEAN NOTES.

The salt beds of Chile could supply the world with salt for ages to come. Salt is found in large bodies 99 per cent. pure and only needs grinding to be ready for table use.

The Chilean Government has appointed a commission of nine to study the patent laws of Chile and recommend changes to bring them down to date in conformity with the patent laws of the leading countries.



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"METALS AND ALLOYS."

In the past eight years THE METAL INDUSTRY has been "a trade journal relating to the non-ferrous metals and alloys," the word "non-ferrous" signifying "no iron." We have always believed, however, that the classification of "metals" without the "non" was sufficient to indicate the purpose of this journal, and in this number, which begins our ninth year, we have dropped from our title the term "non-ferrous" and we now relate to plain "metals and alloys." The metal industry with all of its branches is large enough and great enough to be distinguished from the iron industry by the word "metal" without the aid of a chemical definition, and the simpler term which has been used commercially for a number of years is more comprehensible and understandable.

In starting the new year with a 144-page paper we believe THE METAL INDUSTRY has lived up to its promise of being "Larger, better, more interesting than ever," and that "it covers the field," and we ask the careful attention of all our readers to the valuable information contained in the reading and advertising pages.

The leading reading matter consists of the written experience of the best metallurgical, mechanical and chemical writers of the world—authors who are practical men, engaged in the very art about which they have written. Besides the leading articles, there is the usual useful information in the regular departments of Shop Problems, Patents, Industrials, Associations and Societies, Personals, Trade News, etc. This month these departments have an extra good number of the problems, inventions and devices relating to the metal arts and the latest and best society, personal and commercial news.

The advertising pages are a veritable guide for every kind of a metal shop, in the buying of metals, machinery and supplies, and will continue to be such a guide throughout 1911.

RETROSPECTIVE REVIEW OF 1910—OUTLOOK FOR 1911.

A Brief Report of Business Conditions Existing in the Metal Industry for the Year 1910.

The general business conditions of the United States as a whole at the close of the year 1910, are good with brighter prospects for a gradual return to the full tide of activity enjoyed in 1906. The panic of 1907, like its predecessors of 1873 and 1893, naturally caused liquidation which has continued more or less throughout the year just closed and is still in force. After the depression of 1873, six years were required to restore equilibrium and four years were necessary following the bad times of the year 1893. The business upheaval of 1907, while not so severe as the other periods mentioned was strong enough to shake the confidence of the buying and investing public and heavy liquidation followed which depressed stock values all along the line.

The condition of the country today may be taken as that of a patient in need of a tonic. This tonic being the confidence of the public and this is absolutely necessary to the success of the gigantic operations planned by our "captains of industry and finance." From our observations it seems that this confidence in the future welfare of the country is gradually being restored and predictions are freely made that the fore part of the year 1911 will see an easing up of the money market, but no great business revival will take place until 1911 has passed.

A general attitude of conservatism is evident and probably will control industrial operations throughout the year. Retrenchment as far as will be consistent with natural business development will be in order and the experience of the latter part of 1909, of over-speculation in stocks, lands and commodities with subsequent enforced liquidation will not be repeated. This liquidation has not yet fully worked itself out, and this fact coupled with the over-production in the industrial world furnishes a fairly satisfactory explanation of the present situation.

THE METALS.

The chief factor in the industrial world relating to the metals is, of course, copper. This metal in its ups and downs, controls directly the entire market of non-ferrous metals and plays the all important part in the manufacturing of the thousand and one articles into whose composition copper enters. At the close of the year 1909 it became evident that over-production was so enormous as to cause serious alarm in metal circles and at the beginning of 1910 announcement was made of the attempt to form a copper merger. This merger, rumor had it, was to have a capitalization of $150,000,000 and to combine all the properties in the Butte, Mont., district. This merger met with the usual objection as to mutual agreements common to such enterprises, and these together with the almost universal tendency, reaching even to official circles in Washington, to frown on any movement that might tend to keep prices on a high level, caused either its temporary or permanent abandonment.

An agreement, however, was entered into to curtail production, and although, at present writing, this has not caused any very great depletion in the stocks of copper on hand, indications are not wanting for a more healthy condition of the market in the near future. In relation to the matter of copper curtailment, "Copper Gossip" has this to say:

> "There was some reduction in the United States output of copper last month, but it was too slight to create any improvement in market sentiment. The history of copper curtailment since the movement for that purpose was first started has not resulted in any pronounced rally in prices. In fact, the selling price of copper one year ago was from a half to three-quarters of a cent per pound higher than at present. And comparing the statistical position of the metal twelve months ago with what it is now we find that the official figures show 22,614,458 pounds less copper held by American producers than they had Dec. 1, 1909. Production for November, 1909, was 2,264,906 pounds larger than during last month, and the total deliveries a year ago were 6,101,840 pounds greater than those in November, 1910. With all the apparent changes in the statistics for the better there is nevertheless a falling off in market values of fully half a cent per pound in the price of raw copper. This fact appears to indicate a loss of confidence in spite of the more favorable returns as pointed out. The significance of this feature of the case needs no comment."

The only real happening in copper circles for the year is the recent announcement of the combination of the copper properties of the Lake Superior region, of which the Calumet and Hecla Copper Mining Company and subsidiary companies are the dominant factors. Just what effect this combine will have on the general situation in regard to copper is not apparent just now, but as we remarked in the February, 1910 issue of The Metal Industry we fail to see how this will influence production particularly as the Calumet and Hecla have been running considerably below normal capacity of the past year.

Spelter, a metal which comprises 33 per cent. in the composition of brass and used most extensively in galvanizing operations, has had rather a spectacular career. A glance at the chart of metal prices reproduced in this issue of The Metal Industry will show that it opened the year at six cents and speedily dropped to below five cents. There seemed to be only one explanation of this and as in the case of copper it proved to be over consumption on the part of the country at large. The production increased, but the demand being dull the United States Steel Corporation kept out of the market and a concerted selling movement took place. The price was forced down until we see it at five cents in June. The price of spelter remained for the rest of the year at below what is termed normal.

Lead, this metal is always one of the most mysterious elements of the metal market. No definite information is ever available and guesswork has to be resorted to in order to make any prediction as to fu-

ture movements. The Guggenheim interests practically control the production, they sell to consumers on a fixed price basis. When business is good the independents sell at Guggenheim's prices. With a fall off in the demand, prices are cut and the Guggenheims follow suit.

At the beginning of 1910 the unsold accumulation was undoubtedly large, but in spite of that the price was raised to 4.70c., New York. This could not be held, however, in the face of lower offerings by independents, and by May the market was down to 4.30. Absorption of the independent surplus brought the market back to 4.40, the American Smelting and Refining Company's price, at which figure it held steadily until November, when unexpectedly it was raised to 4.50.

Tin is one of the few important metals that had a continued rise in price throughout the year 1910. At the end of July the price was fairly steady at 32½ to 33¼ cents per pound, which was well above the average for 1909. A sharp rise then started in August and the price soared to 38½ cents in December, owing to the possession of the market abroad by a bull syndicate.

Of course, such a wonderful control of the market must have some substantial foundation. This is to be found in the strong statistical position of the metal. The world's output in 1909 exhibited a decrease as compared with 1908, and it appears that 1910 is going to show a further decrease. Anyway, the arrivals from Malaya, which furnishes upward of 50 per cent. of the total supply, have been materially smaller. The reasons for this are the gradual depletion of the alluvial deposits and the scarcity of labor, due in part to the attraction of the rubber-growing industry.

Aluminum, a very important metal in all classes of industry has increased in consumption until it now occupies an important position in the world's progress. Although the product of the one American producer is protected by a duty of seven cents per pound the importation of foreign metal has increased during the past year. The consumption of the metal has fallen off during the past year and the reasons for this are given in a statement made by an official of the company.

He states that the business suffered from the same causes that existed in all other lines of production. The business of 1910 being much less than that of 1909. The year opened with a very good demand exceeding that of any similar period of the year previous, but at the end of the half year of 1910 business had fallen off to less than 50% of that done for the first part of the year and has diminished gradually since. Some of the reasons advanced for this falling off are: decrease in the use of aluminum as a deoxidizer for steel, curtailment of production in the automobile industry, which caused a drop in manufacture of aluminum castings. A large number of foundries have shut down and practically all of those running are doing so with reduced forces, thus causing a decline in the amount of ingot metal consumed. The foundry branch of the business in fact is reported to show the greatest depression.

The Aluminum Company, in the hope of increased demand, have been running their plants nearly full and consequently have accumulated large stocks of metal. At the present writing some of the company's plants have been cut back to half production and if conditions do not improve still further curtailment will be imperative. In spite of the above, however, it is admitted that some branches of the business have made very material progress. A steady increase of the use of aluminum has been made in aluminum tubing for paper, chemical and similar lines of manufacture and a substantial and large growth is promised for the future.

A business started three years ago and which has had a steady increase, is that of extruded shapes of aluminum. Although no single line takes a large quantity of any one shape an increasing number of places are constantly being discovered with the result that the extruded shapes' output is constantly increasing, and the Aluminum Company of America has this year installed a separate plant of considerable size for this purpose. The aluminum cooking utensil business has also been good. These articles seem to have merit and win their way despite adverse commercial conditions.

Although a new sheet rolling mill has been built at Niagara Falls during the year it has not been put into operation on account of the falling off in sheet business, but as the mill was built to meet future requirements it is still expected that the time will come when this mill will be required.

The aluminum wire and cable business has, of course, followed the electrical installation business. There have been comparatively few transmission lines financed and built in the last few years, and although there was apparently some activity in 1909, present commercial conditions seem to have quieted that revival down again.

MANUFACTURING.

Among the varied industries in which the use of the non-ferrous metals is important, that of the automobile, of course, is the most prominent. Although there have been no disasters during the past year in the way of business failures, a general curtailment of production has been noticed and at least one large producer found it necessary to take up its bonded indebtedness and partially sacrifice its stock in order to secure the necessary capital for the output of 1911. During 1909 a strong demand for low priced cars arose and manufacturers devoted themselves to this class to a large extent. The tendency during the past year has been to cars of higher quality and consequently the prediction is now made that while more money will be invested in automobiles in 1911 than ever before, not many more machines will be sold as the price will be higher. This expression is the con-

sensus of opinion heard at the recent automobile shows held in New York City.

During the past year a gigantic corporation, known as The General Motors Company, was formed, centering the interests of a number of prominent automobile manufacturers and a general bettering of conditions of the trade has been the result. The coming year will probably see a further consolidation with the attendant advantages incidental to reduced manufacturing expense with subsequent increased profits and dividends.

The recent decision of the United States Circuit Court of Appeals that the Selden patents controlling automobile engines, was not being infringed upon by The Lord Motor Company and others, will certainly have an important bearing on the future development of the automobile industry.

Among the industrial concerns business has been steady, and no sudden inrush has been experienced as in previous years. The largest of these in the electrical lines, The General Electric Company and The Westinghouse Electric and Manufacturing Company have been busy largely on railroad electrical equipment and steady conditions with good outlook for 1911 are reported.

The jewelry industry has had a rather disappointing year. 1910 opened with bright prospects which were not entirely fulfilled and the tendency has been towards jewelry of the cheaper kind, so while the volume of business done was fairly satisfactory the monetary return has not been so great as was expected. The prospects for 1911 are for a steady though slow revival of trade conditions.

The metal goods manufacturing houses, particularly those catering to the automobile trade, have naturally not been as busily employed as formerly, although there has been very few failures. A notable incident relating to a manufacturing concern, is the reported decision of the Aluminum Goods Manufacturing Company, the formation of which was reported in THE METAL INDUSTRY, April, 1909, to move its factory from Newark, N. J., to Two Rivers, Wis. If the report is correct it will remove a valuable industry from New Jersey and add it to the West. The principal reason given for this change is that consolidation of interests will result in economy of manufacture.

Other important happenings in the manufacturing line was the passing out of existence of the Waterbury Crucible Company of Waterbury, Conn., mentioned in THE METAL INDUSTRY for November, 1910, and the proposed establishment of a crucible factory in Detroit, Mich. The West thus gains two important industries which it seems the East could ill afford to lose. In New York City the old established firm of The Zucker and Leavitt and Loeb Company, manufacturers of platers' supplies has passed out of existence through inability to realize on its assets. Two new concerns have arisen from the ashes of the old, however, so that New York has gained rather than lost.

ROLLING MILLS AND FOUNDRIES.

There have been no new developments to report regarding brass and copper rolling mills during the past year. The Western mills have held their own, but it is suspected in the face of some rather sharp price cutting on the part of their Eastern competitors. Prices have not held to the steady level obtaining throughout 1909, and not much better conditions are looked for during the fore part of 1911. No new mills have been started despite the rumors afloat at the close of 1910.

The foundries have had an uneventful year with fair prices prevailing. Those catering to the automobile industry, having experienced a rather dull summer with a slight picking up in the early fall. The outlook is now bright for increased business and numerous planned extensions will undoubtedly soon be carried out. There have been few failures and on the whole, the year has been fairly satisfactory in the face of existing conditions.

NEW BOOKS

THE JOURNAL OF THE INSTITUTE OF METALS. Volume III. Edited by G. Shaw Scott, M. Sc., Secretary. Size, 5½ x 8¼ inches; 340 pages; numerous illustrations. Published by the Institute of Metals, Caxton House, London, England.

The Institute of Metals has just published the fourth volume of its Proceedings. The major portion of the Journal consists of a series of papers of scientific interest, which were read at the third autumn meeting of the Institute held in Glasgow, Scotland, in September, 1910, and covers 270 pages. Valuable though these papers were when they were read, their utility is now vastly increased as a result of written communications which have been received since the papers were read by men eminent in the scientific and metal-working worlds.

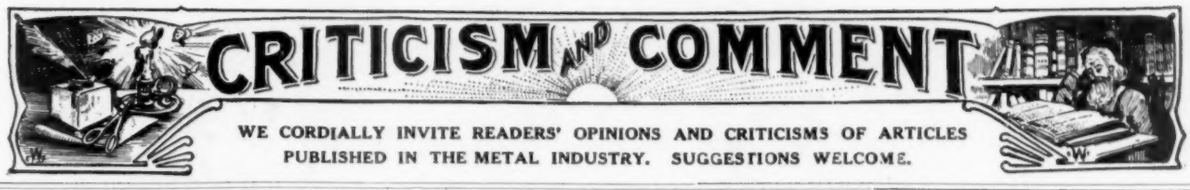
The first part of the book is covered by the paper of Prof. William Gowland on "The Art of Working Metals in Japan," which was read at the May meeting, held May 24, 1910, at the Institution of Mechanical Engineers, Storey's Gate, Westminster, S. W.

The useful series of abstracts of papers relating to the non-ferrous metals and the industries connected therewith which was commended in the second volume of the Journal has been continued and amplified in the volume under notice, and there are now fifty-six pages devoted to abstracts on such subjects as Ores and Minerals, Extraction of Metals, Electro-Metallurgy, The Properties of Metals and Alloys, Analysis, Testing and Temperature Measurement, Statistics, and Bibliography.

The Journal is issued twice yearly, in June and December, respectively, and is published by the Institute. All members of the Institute receive cloth-bound copies of the Journal gratuitously, but copies can be purchased for one guinea each from the offices of the Institute, Caxton House, Westminster, S. W.

MECHANICAL EFFECT OF HEAT ON BRASS.

Tests have been made on the mechanical properties of brass wire at high temperatures. It has been found that the maximum stress falls off continuously. The elongation and contraction of area, on the other hand, fall off to a very low value at temperatures between 300 degs. Cent. and 400 degs. Cent., after which a recovery of ductility occurs, and is practically maintained even at 590 degs. Cent., the highest temperature employed. The suggestion is made that any handling of the material at a slightly higher temperature than usual may cause a permanent deterioration in its properties.



CHEMICAL ANALYSIS OF SPELTER

To the Editor of THE METAL INDUSTRY:

Since the first part of the article entitled "The Chemical Analysis of Spelter," by Andrew M. Fairlie, appeared in the September number of THE METAL INDUSTRY the writer has awaited with interest the appearance of the second installment, which is found in the December number. The subject matter is treated in an exceptionally clear and concise manner, and contains many points worthy of especial emphasis.

I cannot too heartily agree with Mr. Fairlie on the subject of sampling. One slab out of every ten should be taken for sampling to secure a reliable average of the shipment. Spelter is notorious for segregation of its impurities, and the practice of calling into question the quality of a shipment on the strength of an analysis of a small piece broken from one corner of a slab, is entirely unreasonable and unjust.

The drill method of obtaining a sample for analysis is good, though open to serious drawbacks if not properly carried out, the most serious of these being the contamination of the sample with iron. The removal of particles of iron by means of the magnet has been mentioned in the article under discussion, but this is not sufficient. The drill, best a 3/8" twist drill, must be kept sharp and must be fed slowly enough so that it will clear itself of all drillings. If a small piece of zinc adheres to the point of the drill, the machine must be stopped and the shaving removed with a scratch-awl or other suitable tool.

If this be not done, the drillings are liable to pick up iron from the drill in such a firmly adhering form that removal by means of the magnet or otherwise is out of the question. In this laboratory a sample of spelter drilled improperly, showed 0.20 per cent. Fe. An investigation showed this to be the cause of the high result, which should have been 0.01 per cent.

As to grinding the drillings or cutting them with snips, it is obvious that the less the zinc comes in contact with iron the better. This method of sampling is mentioned thus at length, because at the majority of works the apparatus is not at hand with which to perform this operation in the most acceptable manner, viz., by sawing the slab completely through with a band saw, analyzing the sawdust so obtained.

Passing to the scheme for the zinc assay, we are directed to weigh out 0.3 gram of the spelter borings. This is difficult to understand. It is entirely impossible to get an average of a sample composed of pieces such as are obtained by the method given, in any such small amount as 300Mg. The amount weighed up should not be smaller than 25 grams, better 30 or 40. This, after solution, is made up to a definite volume, and an aliquot portion taken for the analysis. If greater accuracy is desired the Sp. Gr. is ascertained, and an amount of the solution corresponding to 0.3 gram of spelter is weighed out. Then having secured by means of the large sample the requisite correctness of average, the analysis may proceed as directed, noting, however, that ammonium molybdate in 1 per cent. solution is much superior to uranium salts as an indicator, being colorless and presenting a distinct change with the first trace of excess of ferrocyanide.

We may mention in passing, that in "Waring's Modified Method" the neutralization is carried almost to completion with KOH, and finished with NaHCO3. After the solution of the precipitated ZnS the solution should be boiled 30 minutes to expel H_2S. With regard to the determination of lead: Some time ago an article on this subject by Mr. Ericson appeared in the English Mining Journal,* to which I must refer those interested. Suffice it to say that an error of from 25 per cent. to 55 per cent. is committed when lead is separated as the sulphate without the addition of alcohol. Perhaps this is included in "the usual precautions," but the inference is to the contrary. The iron is, unless very high, much better determined colorimetrically in a separate portion in nitric acid solution by means of a standard spelter and NH_4SCn. The scheme for cadmium is excellent, so far as obtaining of the primary solution is concerned, if, however, the procedure given below is followed, the final separation of Zn and Cd is effected in one operation, and with a great saving of time. Dissolve the spongy mass of Cd, Zn, and Pb in 10cc. dilute nitric acid (1-1), add 10cc. con. sulphuric acid and evaporate to copious fumes. Dilute, when cool, to 40cc., boil, cool, and filter off the lead sulphate, washing with cold water containing sulphuric acid. Add ammonium hydroxide to neutrality, and 25cc. additional, and about 25 grams of solid potassium cyanide (highest purity). Pass hydrogen sulphide gas for 25 minutes, and filter after settling, washing with hot water. The cadmium thus separated, the determination may go on at will, preferably by adding 25cc. of a 25 per cent. solution of ferric sulphate and 25cc. sulphuric acid (1-4) to the precipitate and filter in the flask in which the precipitation took place, and titrating the reduced iron with permanganate.

W. H. LEVERETT,
Chemist, Hegeler Bros., Danville, Ill.

Danville, Ill., December 29, 1910.

* English Mining Journal, 87, 1036.

NEW YEAR'S THOUGHTS.

To the Editor of THE METAL INDUSTRY:

As the bells and whistles are ringing and tooting out the old year and bidding welcome to the new, I think it is in keeping with my thoughts to write you a few lines of how valuable a paper I consider THE METAL INDUSTRY for every electroplater. Your journal is an incentive to renewed efforts in the art of plating and it also brings to mind many things about the art that are useful and might be forgotten. I have never had the pleasure of meeting your able Plating Editor, Charles H. Proctor, but I hope to some day, for I consider him a very able man. Regarding my plating ability, I can only say that twenty years ago I thought I knew something about plating and lacquering, but I have come to the conclusion that I was mistaken and I am positive now that I never knew anything about either, the problems in the art are so many.

However, I am pleased to be a salesman of chemicals and lacquers and meet the men who have worked out successfully such a number of plating problems.

J. A. GARDE.

Waterbury, Conn., Jan. 1, 1911.

ALL METAL MONOPLANE OF MOISANT.

To the Editor of THE METAL INDUSTRY:

Replying to your letter of Dec. 20, I beg to state that the metal monoplane which I shall use here is of metal throughout, except for the supporting wings and the landing and starting wheels. Of course, the propeller is of wood; as is also the steering gear; the body of the machine, the tail and the rudder, is of metal. This metal is an alloy of steel and aluminum, rolled into sheets.

Yours very truly,

John B. Moisant

New Orleans, La., Dec. 28, 1910.

[The above letter from the celebrated aviator who met a sudden and tragic death two days after he wrote it, is very interesting, due to the fact that he mentions an alloy of aluminum and steel, thus showing the expansion of the use of aluminum. —ED.]

PLATERS' SUPPLIES IN MONTREAL

To the Editor of THE METAL INDUSTRY:

Regarding supplies for plating in Montreal, McArthur, Corneille & Lyman are the principal dealers in Montreal, and most of the goods they handle are imported from the States, although they import considerable cyanide, ammonia and sulphuret of potash from England. I always felt that the firms who handle platers' supplies in Montreal never made much of an effort to find out what line of chemicals to carry in stock to meet the requirements of the plater. I have had trouble getting such ordinary things as bisulphite of soda, carbonate of zinc and nickel salts. I do not think there is a firm in the city that carries nickel anodes; whenever I wanted them we had to send to the States. The most peculiar thing of all to obtain is hydrofluoric acid. In the States, I believe, it costs about five cents per pound; in Montreal some will sell it to you for forty cents and others ask sixty cents per pound. They supply it in a leaden container holding about three gallons, and charge a big sum for the container, as it is lead burned. The Garth Company, my former employers, used to pay $10 for it. They would be big users of this acid if they could get it for a reasonable price, and no doubt others would use it, too. The Buffalo Wire Works, Montreal, get their hydrofluoric acid from Philadelphia and pay $6 per barrel for it; the barrel holds about sixty gallons and is lined with pitch and bound with iron bands. The former Zucker & Levett & Loeb Company did a big business here in polishing and buffing supplies. Hanson & Van Winkle, I should judge, came next. The Egyptian Lacquer Company seem to have the whole of the lacquer business in their hands. "CANUCK."

Canada, Jan. 10, 1911.

SHEET COPPER PRICES

To the Editor of THE METAL INDUSTRY:

Regarding the comments on the base price of 18 cents for sheet copper published in your publication, I beg to say that this rate is still in force and manufacturers try to obtain that price whenever possible, but just as you say on page 532 of your December, 1910, issue, under "Metal Market Review," paragraph "Sheets," the market is becoming demoralized so far as sheet copper prices are concerned and some cutting is being done. While it may not appear so, there is an understanding or gentlemen's agreement among the sheet copper manufacturers to maintain a price of 18c. for base sizes, with the privilege of allowing 7½% discount if necessary to meet competition, and I have heard lately that allowances of better than 7½% are being made.

New York, Dec. 26, 1910. "MARKET MAN."

ABSTRACTS FROM CURRENT FOREIGN PUBLICATIONS.

THE GASES OCCLUDED IN THE ALLOYS OF COPPER.

From the notes of Messrs. G. Guillemin and B. Delachanal, in Compt.-rendus, Nov. 14, 1910.

In a preceding communication (Comptes rendus, Dec. 14, 1908), we described the arrangement used, under a vacuum we employed to extract the gas contained in a special brass, which was full of blowholes and we have made known the volume and composition of the gas extracted at a temperature of 1,000 deg. C.

Various samples of pig tin, phosphor-bronze, special and forgeable brass were taken from various French, Belgium and German foundries for maritime and other industrial concerns.

In the following table the data are collected:

Type of Metal.	Ratio of volume of gas to volume of metal.	CO_2%	H%	CH_4%	CO%	N. & Difference%
A. Special brass....	1.12	1.90	91.53	2.38	3.56	0.63
B. Special brass....	0.84	0.30	79.10	1.40	17.90	1.30
C. Special brass....	26.00	8.7	59.60	1.30	29.50	0.60
D. Aluminum brass.	24.20	2.06	95.84	0.60	0.90	0.60
E. Special brass....	71.00	1.00	99.00	...	....	*..
F. Special forgeable brass	2.30	2.30	92.60	2.30	0.20	2.60
G. Forgeable brass..	0.43	3.20	93.30	1.20	1.10	1.20
H. Bronze	7.30	16.20	59.90	7.20	16.40	0.30
J. Bronze	0.78	86.70	13.00	...	....	0.30
K. Phosphor bronze	0.28	58.00	40.80	...	....	1.20
L. Commercial tin..	0.19	14.50	63.00	5.40	12.30	4.80
M. Tin (gray modification)	0.21	14.70	71.70	4.90	0.50	8.20

*The figures given for the total volume of gas extracted are only approximate, the disengagement having been very hurried in this test, and this did not permit of an exact measurement.

Conclusions.—From our observations and the figures derived from them, it is seen that:

1. The special forgeable brass retained in the occluded state an important volume of the gas (1 in 30) composed especially of hydrogen, carbonic acid and carbonic oxide.

2. In the sound pieces the gas occluded is almost exclusively composed of hydrogen (more than 90 per cent.).

3. In the cast pieces, not sound, the hydrogen is accompanied by an important proportion of carbonic oxide and a little carbonic acid.

4. That brass obtained by squeezing or hammering while hot contained less gas than cast pieces.

5. In the sound pieces the presence of occluded hydrogen even in notable proportions does not appear to have a troublesome influence upon the mechanical properties of forgeable brass.

Our experiments have been carried on to show what has been submitted to the effect of resistance to traction and in which we have utilized the projecting portion to determine the gas occluded.

The figures obtained were as follows:

Nature of Test.	Volume of H occluded.	Traction Test. R.	E.	%
O. Cast brass.....	> 1	42 kg.	19 kg.	25
P. " "	> 20	50 "	18 "	28
Q. " "	> 20	60 "	30 "	16
R. Drawn brass.....	> 2	45 "	22 "	26

6th. Phosphor bronzes contain less of the occluded gases which are composed almost exclusively of carbonic acid and hydrogen. For the bronzes, as for iron and steels, phosphorus appears to diminish the solubility of hydrogen in the metal. (Troost and Hautefeuille. Compt. rendus. Vol. 76, p. 562.)

7. The tin of commerce, in the form of pigs, or in bars, contains a slight volume of gas, composed of carbonic acid, hydrogen and carbonic oxide.

8. The metals we have studied which are exempt from blowholes and dross give rise to the phenomena of excrescences such as are observed upon silver, steel, etc., sometimes referred to as "spitting." (Troost and Hautefeuille. Comptes rend. Vol. 76, p. 482, and Colonel Caron. Compt. rend. Vol. 62, p. 296.).

The occluded gas can be extracted only when the fusion temperature is reached in a vacuum or at least in a rarefied atmosphere.

9. Some micro-photos obtained by M. H. Le Chaletier with a microscopic magnification of 100 diameters are added to this note. C. P. KARR.

ORDINARY SOLDER ON ALUMINUM.

Norwegian patent No. 16,701 covers a process of soldering aluminum with ordinary solder. The surfaces to be soldered are cleaned first with sulphuric acid, then washed and cleaned again in a 10% soda solution. It is next dipped in a bath made as follows:

Nickel sulphate	4 parts.
Sal-ammoniac	2 "
Citric acid	0.2 "
Water	100 "

This leaves a thin film of nickel on the surface of the aluminum. A second dip contains.

Chloride of tin	0.2 parts.
Pyrophosphate of soda	2 "
Water	100 "

This forms a deposit of tin, after which solder may be used in the ordinary way.

Shop Problems

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY.

ALLOYING

Q.—Will you kindly give us the formula for a bronze alloy which will give the very best service when used as a bearing for metal rolling mill work?

A.—For severe service in rolling mills a bronze is often called for that will show an elastic limit in compression of not less than 22,000 pounds, and a permanent set of not to exceed 1/16 inch under a load of 100,000 pounds in a one-inch cube. The following mixture is said to meet this specification:

Copper	90
Phosphor Tin	10

Fifteen per cent. phosphor-copper is preferred by many founders to the phosphor-tin.—J. L. J.

CASTING

Q.—Please give me full instructions for casting copper and brass anodes so that they come out of the sand with a bright, clean color.

A.—The bright color on the brass and copper anodes to which you refer is probably due to an acid dip. You can make solid copper castings in sand by adding eight ounces of silicon-copper to each hundred pounds of ingot copper. It is better, however, to use pure copper only and cast the anodes in copper molds. The sand blast gives a good finish to castings and discloses any slag spots or imperfections.—J. L. J.

COLORING

Q.—Can you tell me of any dip or stain that will color bronze wire a steel color?

A.—For coloring brass or bronze wire a steel color dissolve one pound of pulverized white arsenic in one gallon of muriatic acid, using the solution hot. The fumes from this dip are very strong, so it is advisable to have it placed under a suction blower or a good strong draught. By regulating the amount of arsenic the color will vary. Very little arsenic gives a brown tone, especially when the solution is used nearly cold; increasing the arsenic and the temperature of the dip will give a dark steel.

Another dip that should give excellent results in coloring wire consists of the following:

Sodium hyposulphite	1 lb.
Acetate of lead	½ lb.
Water	1 gal.

Use the solution near the boiling point. Immerse the cleansed wire in the solution for a few seconds, which will produce a golden color, if the wire is brass or bronze. Remove from the dip and wash in water. Now prepare a solution consisting of four ounces of your pickling dip and one gallon of water. Immerse the wire in this dip and the golden color will turn brown. Then remove, wash and dry. If darker tones are required two or three immersions will give you results.—C. H. P.

CORROSION

Q.—What effect has the following metallic coating as a corrosion resistant—steel pipe, plated first with copper and then with zinc? Copper being negative should cast corrosion onto the steel of the pipe and the zinc protects the copper, which does not require such protection.

A.—You are right in thinking copper negative to iron, but the reason why the duplex coating you describe would probably be a failure is that electroplating seldom gives an impervious coating. If the coating of copper is placed on the steel by mechanical means as in the Monnot process, instead of by the electro-chemical process, it would undoubtedly be a protection against corrosion as copper does not rust like iron. If a coating of zinc should be placed on the copper by the sherardizing process, it would prevent the copper from tarnishing or becoming coated with verdigris and hence would protect it. The mere plating of steel pipe with copper and then with zinc, however, would not be advisable.—J. L. J.

DEPOSITING

Q.—Will you please tell me through the Shop Problems column what causes a dark deposit of nickel on the work where it fastens to the rack? The solution stands at 5 deg. Be. and the nickel is deposited directly upon the lead and tin.

A.—Dark nickel deposits as noted by you are oftentimes caused by too long a use of the frames used in plating the articles. The constant piling up of the nickel on the frames causes a heavy spongy deposit when a certain thickness is produced. The action of the solution produces ammonia in this spongy deposit which causes the dark deposit noted on that portion of the article suspended on the frame. Your remedy is to hammer off the nickel from the frames when it becomes too thick, thus avoiding the spongy deposit that causes your trouble. Dark lines are also caused by a poor conductivity of the solution. In this case two ounces of sal ammoniac added to each gallon of solution will overcome the difficulty, providing the solution contains the normal quantity of metal.—C. H. P.

DIPPING

Q.—We would thank you to give us a formula for an alumium bright dip for pure aluminum castings, and for aluminum zinc alloy castings.

A.—For bright dipping aluminum or aluminum zinc alloy castings the following methods should be used: First, prepare a potash solution by dissolving in each gallon of water one pound of caustic soda, using this solution in an iron tank heated with an iron steam coil to 180 degrees. Second, in a glazed earthenware jar of suitable capacity for your purpose place commercial aqua fortis of 38% Baumé, and then proceed as follows: Immerse the articles for a few seconds in the potash bath (if they are greasy or oily they should be previously cleaned with benzine or gasoline). The articles should then be removed and washed in clean, cold water. They will be coated with an oxide of aluminum. Now immerse the articles in the aqua fortis dip, which will remove the oxide instantly, leaving the surface of the metal with a white opaque surface. The articles should then be rewashed in cold water, passed through boiling hot water, and to avoid stains dried out in maple sawdust.—C. H. P.

FUSING

Q.—Will you kindly publish a formula for a metal that will fuse at from 210 to 212 deg. Fahr., and cost between 50 and 60c. per pound?

A.—We are unable to give a formula for a metal melting at the temperature given, at the price specified. The nearest we can come to it is bismuth 8, lead 4, tin 4 parts. This mixture it will be seen will cost in the neighborhood of one dollar per pound.—K.

INKING

Q.—Please publish a formula for preparing etching or transferring ink.

A.—The usual formula for preparing etching or transferring ink, used in litho work is as follows:

Tallow	2 parts
Colophonium (rosin)	1 part
Venetian turpentine	1 "
Shellac	2 parts
Lamp black	2 "

Melt these ingredients, mixing thoroughly, in an iron pot, using a coal fire. If the above is to be used for zinc transferring, add

Yellow wax	1 part
Burgundy pitch	2 parts

In order to work this ink with rollers for making impressions it should be mixed with one-third part of good litho printing ink (proving ink). After the transfer is down on the plate it must be "rubbed up" so as to charge it with additional ink. There are a number of more or less elaborate formulas for transfer ink, but this is a fair specimen.—E. F. W.

INSULATING

Q.—We are endeavoring to plate copper on rods for electrical purposes, and of course want to get a good contact between the copper and the substance being plated. This substance is a comparatively poor conductor of electricity. As some of this material has a resistance of about 1,000 ohms for a rod 6 ins. in length and ½ in. in diameter, we have experienced a great deal of trouble in effecting the plating, and we would ask you to let us have any information you possess through your valuable paper.

A.—The following method will probably assist you in overcoming your difficulty: Dissolve green rubber in bisulphide of carbon by agitation, producing a thin cement. Then add a small proportion of turnpentine and boiled linseed oil, previously mixed, in equal proportions, and add only as much of this mixture as required to give a slight tackiness to the cement. Apply with soft brushes or have sufficient on hand so that the rods can be immersed, using care to have the receptacle air tight when not in use to prevent evaporation of the solvent. In a few minutes, after the cement has been applied, rub on copper bronze powder by the aid of a soft brush, or roll the rods in the powder and when dry brush off the excess of powder.

When the metalized surface is thoroughly hard, immerse in a silver dip solution, which should consist of

Silver chloride	½ oz.
Cyanide of potassium	1 oz.
Caustic soda	4 ozs.
Water	1 gal.

Use the solution slightly warm. This will give the bronze surface a light silver coating. The usual acid copper depositing can then be carried out after washing the silvered surface in water.—C. H. P.

LACQUERING

Q.—Please let us know what tanks you consider best for lacquering.

A.—For small work we would advise using porcelain jars or glazed pottery, as there will then be no chance for any action on the lacquer. For large work heavy tin tanks, soldered with pure tin, instead of the ordinary lead and tin solder, is best.

Where the tank is to hold a large amount of lacquer, it is best to make a wooden tank, then fit a tin tank so it will set down on the inside. Care should be used to have this fit perfectly, then there will be no strain on the tin. Our experience has been there is absolutely no chance for any trouble where either of the above containers have been used to contain lacquers.

MIXING

Q.—What is the mixture and in what manner melted of an aluminum hardener that when poured in strips in an open mold will give forth a musical tone such as would come from a banjo or guitar?

A.—A very satisfactory hardener for aluminum is the following:

Copper	40
Aluminum	60

It may be made in a crucible, but is made more satisfactorily in the electric furnace and may be obtained from the Electric Smelting & Aluminum Company, Lockport, N. Y. Make your mixture up as follows:

Hardener	17½
Aluminum	82½

In buying your aluminum obtain it as low in silicon and iron as possible or your alloy will be brittle.—J. L. J.

OXIDIZING

Q.—Please give me receipts for making copper and oxidizing copper solutions?

A.—A good copper bath can be prepared as follows:

Cyanide of potassium	6 ozs.
Carbonate of copper	3 "
Bisulphite of soda	2 "
Sal soda	1 oz.
Water	1 gal.

The solution may be used hot or cold. To prepare the bath dissolve the cyanide in lukewarm water, using one part. Dissolve the soda salts and the copper in the remaining water and mix well together. Use anodes of soft sheet copper.

For oxidizing copper dissolve one ounce of sulphuret of potassium and one-quarter ounce of sulphate of ammonia in each gallon of water.—C. H. P.

PLATING

Q.—I have a nickel, arsenic and iron solution made acid with muriatic acid, using brass anodes. The solution gives up a fine deep black color, but the deposit is powdery and not very adhesive. Can you tell me how to obtain a hard, smooth and lustrous deposit with the same solution?

A.—Your solution probably contains too much water. To overcome your difficulty and give you a hard, smooth, lustrous deposit proceed as follows: Heat one or two gallons of muriatic acid as hot as possible, which should be accomplished with a regular acid crock and should be heated out of doors. Then add as much white arsenic as the acid will absorb. When cool add to your solution. Remove the brass anodes and use nickel for some time. The acid acts upon the brass anodes when the solution is not in use and in all probability contains too much copper and zinc. After the above addition has been made use a weak current and your work will come out clear and bright.—C. H. P.

REDUCING

Q.—Please inform us through the Shop Problems Department how to reduce carbonate of lead into metallic lead, and how to reduce chippings which accumulate around white lead plant and are mixed with refined linseed oil?

A.—Carbonate of lead may be reduced to metallic lead by mixing it with finely divided charcoal or other material rich in carbon and fusing in a crucible, using carbonate of soda as a flux. With proper care in melting practically all the lead carbonate should be reduced. The chippings may be treated in the same way. The remains of the linseed oil will act as an aid to the carbon in reducing the lead from the carbonate form.—K.

SPOTTING OUT

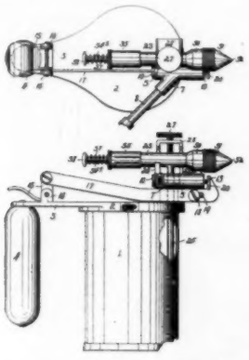
Q.—Will you please give me a sure and safe method of preventing the spotting out of copper plated (highly polished) brass castings?

A.—A method recently tried by a plater who claims excellent results is to immerse the articles after washing thoroughly in a 3 per cent. hot solution of sodium sulphate for five minutes. After immersion the articles are again washed by the aid of cold and boiling water.—C. H. P.

PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

977,281. Nov. 29, 1910. AIR BRUSH. T. A. De Vilbiss, Toledo, Ohio, assignor to the De Vilbiss Manufacturing Company, Toledo, Ohio.

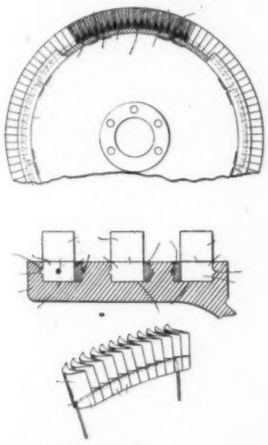


This is an atomizer or air brush that is adapted for applying lacquer, varnish, paint, bronze, or other liquid pigment in spray form upon any surface.

The object of the invention is the provision of an improved apparatus, as shown in cut, which is simple and efficient in its construction and operation, capable of having its parts easily and quickly disassembled for the purpose of cleaning, and which is provided with a combined throat cleaning and spray regulating member, which is capable of adjustment to regulate the density of the spray and of movement to clean the discharge end of the spray-head throat without disturbing the adjusting means.

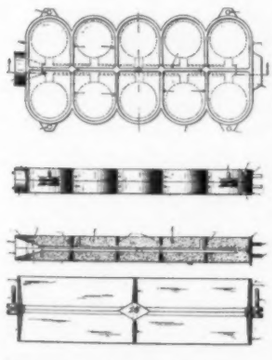
977,300. Nov. 29, 1910. BLADING FOR TURBINES. L. A. Haines, Columbus, Ohio.

As shown in the cut, the main object of this invention is to provide a plurality of turbine buckets assembled in flexible relation in predetermined lengths in the form of sections and to apply the said sections regularly around a carrying element in such manner that the individual sections may be readily removed when burned out or otherwise unfit for further use and replaced by a similar section without disturbing the remaining sections or dismantling the turbine.



977,546. Dec. 6, 1910. ART OF CASTING NON-FERRIC METALS. F. J. Phillips, Chicago, Ill.

This invention has general reference to the art of producing non-ferric metal castings, such as are made in brass foundries, and especially that class of castings which are produced in large quantities, and which are generally termed "straight work," that is to say, work which is produced from gated patterns, and which runs either continuously or repeats at greater or lesser intervals of time. This class of patterns are almost invariably molded in standard flasks, but in many cases these flasks are too large or too deep, or both, to suit the work, thereby causing considerable loss and waste of sand and labor in handling the same to produce the molds. On such straight work, the best output on the tub in brass foundries is thirty molds per day, while by this improved system of producing these castings it is possible to make twice and three times this number of molds in the same time without any, or but a very few, scrap or defective castings.



To obtain these very desirable and important results, this invention comprises the employment of a series of flasks, the exterior shape and depth of which is governed entirely by the shape and thickness of the castings to be produced. In these flasks there is formed a series of partitions, so that each pattern on the gate is contained in a separate compartment, each compartment being separately rammed. These molds are then baked in a bake oven to make them very hard and easily handled, so that no gases are formed in said molds when the molten metal enters the same, thereby preventing oxidation of the metal and blowholes, cold shuts, and other defects in the castings, vents being drawn from the sides of the flasks, preferably from each compartment to provide for the escape of air from the mold when the metal enters the same.

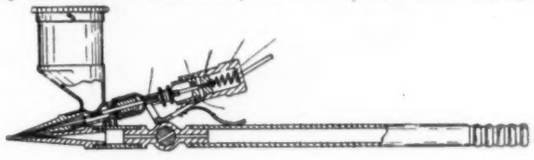
978,212. Dec. 13, 1910. PROCESS OF REFINING COPPER. W. S. Rockey and H. Eldridge, New York, N. Y.

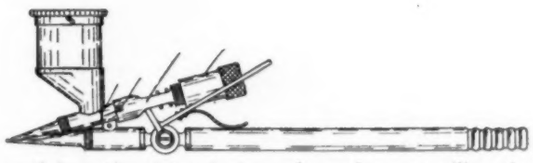
This is a method for the repairing particularly of cathode copper from the depositing tank preparatory to the casting of wire bars. The process consists in fusing and refining cathode copper under a flux which is composed of boron trioxid or of boron trioxid and silica; the silica is used to satisfy and prevent the action of boron trioxid on the silica of the hearth or crucible that may be used, and the reduction of the surface and contained oxids of the copper or other elements which dissolve or are held in suspension in the flux, which are consummated by the contained impurities of the cathode copper.

It is claimed by the inventors that copper may be produced with an electrical conductivity of 101 per cent.

978,469. Dec. 13, 1910. COLOR SPRAYER OR DISPENSER. Hans Nickorey, of Schöneberg, near Berlin, Germany, assignor to Minimax Consolidated, Limited, of Berlin, Germany.

This is a device, as shown in cut, arranged to stop the flow of dye or other sprayed liquid, so that when the operation is interrupted no more color or dye will be ejected from the nozzle.





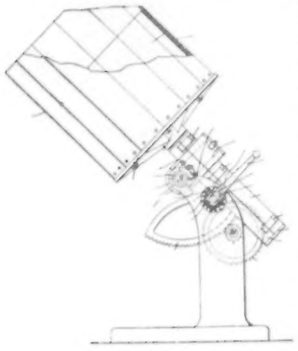
This end is achieved by the use of a valve controlling the delivery of color, with a self-returning piston arranged on the valve-rod. The piston sliding in a cylinder having a small opening, for aspirating and slowly discharging air by means of said piston, substantially as set forth.

979,394. Dec. 20, 1910. PROCESS FOR THE PRODUCTION OF ALLOYS OF TIN AND TITANIUM. A. J. Rossi, Niagara Falls, N. Y., assignor to the Titanium Alloy Manufacturing Company of New York, N. Y.

This invention consists of a process for producing an alloy of tin with titanium which comprises bringing titanic acid and oxid of tin into the presence of tin and aluminum while molten together, subjecting the mass to a temperature sufficient to insure reduction of said titanic acid and said oxid of tin by said aluminum, and withdrawing and cooling the resulting metallic product.

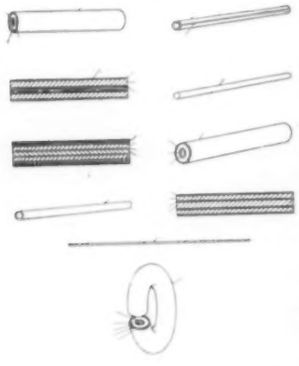
978,524. Dec. 13, 1910. Tumbling Barrel. F. E. Warner, Bridgeport, Conn.

This is an improvement in tumbling barrels of that class known as tilting tumbling barrels, as shown in cut, and the object of the improvement is to provide a device which will be easier to operate than heretofore, more effective and of greater durability.



One of the principal features of this barrel is a brass lining made in one piece. The advantages of such a lining are at once apparent, as it will be seen that such lining not only protects and preserves the wooden portion of the barrel but makes the work of polishing much quicker as it gives a contact of brass on brass, where brass objects are those being tumbled.

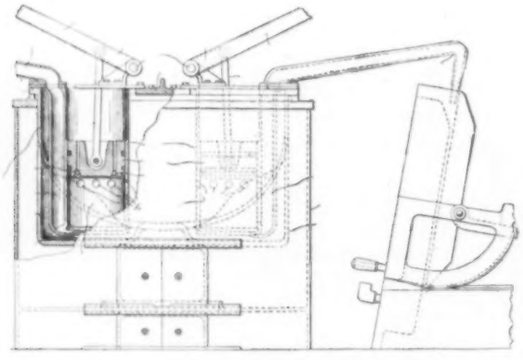
978,846. Dec. 20, 1910. Method of Making Seamless Wire. T. F. Carlisle, Providence, R. I., assignor to the Improved Seamless Wire Company, Providence, R. I.



The invention relates to an improved method of making seamless wire, as shown in cut, and intended for use in ornamental chain links and other articles of jewelry. The process consists in uniting by fusion a plating shell to a base metal tube, fluxing a base metal core and a solder tube, inserting the core within the solder tube, introducing the core and solder tube into the base metal tube, and reducing the assembled parts to wire without the fusion of the solder tube.

979,101. Dec. 20, 1910. Metal Melting Furnace. Isabelle Scott and D. J. Scott, Plainfield, N. J., executors of Walter Scott, deceased.

The present invention relates generally to metal melting furnaces, and has more particularly reference to a metal melting furnace, shown in cut, used in connection with stereotyping apparatus. The chief object of the invention is to keep the metal hot while pumping it out of the melting pot, and to enable metal



to be drawn out readily even when there is a comparatively low level of molten metal in the melting pot.

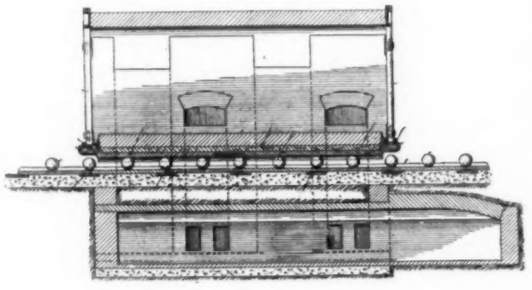
To this end the invention consists chiefly in providing the melting pot with a pocket preferably extending below the normal level of the bottom wall of the melting pot, and in supporting a pump cylinder in line with the said pocket and extending into the same in such a manner that the said cylinder is free from contact with the walls of the melting pot and pocket.

979,393. Dec. 20, 1910. Alloy of Zinc and Titanium and Process for Their Production. A. J. Rossi, Niagara Falls, N. Y., assignor to Titanium Alloy Manufacturing Company, New York, N. Y.

This is a process for producing an alloy of zinc with titanium which comprises bringing titanic acid and oxid of zinc into the presence of zinc and aluminum while molten together, subjecting the mass to a temperature sufficient to insure reduction of said titanic acid and said oxid of zinc by said aluminum, and withdrawing and cooling the resulting metallic product.

974,425. Dec. 27, 1910. Annealing Furnace. James L. Butler, Alliance, Ohio.

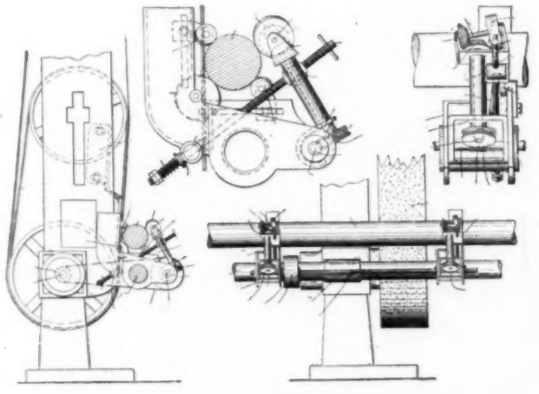
This invention relates to improvements in annealing furnaces used for annealing metallic articles. In annealing furnaces in which the article to be annealed are introduced and withdrawn from the oven on cars or trucks, trouble has heretofore been experienced, owing to the warping, twisting, distorting, and expanding and contracting of the car or truck, due to the great heat, especially in the annealing of flat plates. With such articles it is particularly important that the car shall remain per-



fectly flat, even though subjected to considerable variations in temperature, and to effect this result the car is provided with balls on which to roll, and so construct the device, shown in cut, that the expansion and contraction does not interfere with the proper action of the anti-friction balls, and does not result in detrimental distortion of the car or the plates which it supports and carries.

980,052. Dec. 27, 1910. Grinding and Polishing Machine. J. C. Blevney and J. Hausman, Newark, N. J.

What is claimed by the inventors of this polishing machine, shown in cut, is as follows:



The combination of a flexible abrasive element, a bracket having an extension, a backing plate pivotally connected to said bracket, a bolt connected to said extension and having a spring which presses the backing plate yieldably toward the abrasive element, a lever pivoted to said bolt and having a cam surface mounted between the extension and backing, an adjustable stop for determining the movement of the backing, and a plurality of independently-movable yieldable elements carried by the plate and projecting therefrom toward the abrasive element.

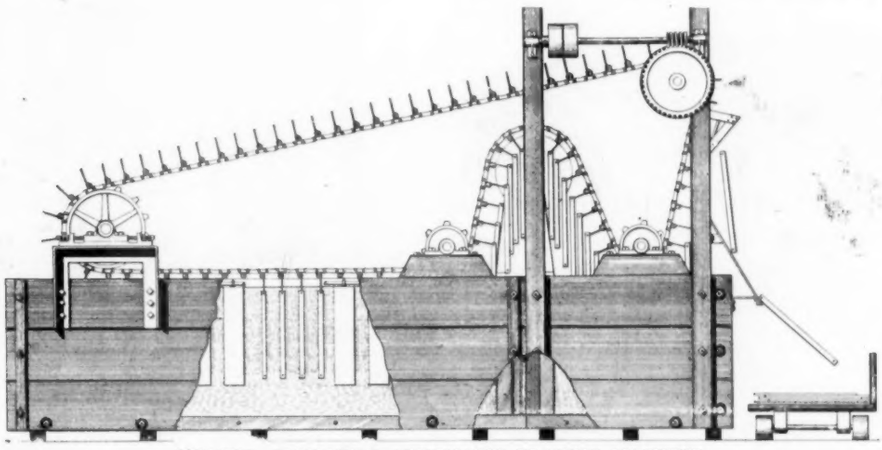
INDUSTRIAL

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

NEW AUTOMATIC PLATING MACHINE

The machine shown in cut has been designed and patented by the Meaker Company, job galvanizing, and installers of electro-galvanizing equipments, Chicago, Ill. This machine was originally designed for galvanizing large quantities of cross arm braces, all sizes, and, of course, is most feasible for galvanizing or electro-plating similar goods in quantities, also short rods, strips, tubes, etc.

It has been the experience of the Meaker Company that a great many concerns install electro-plating machines for handling a certain staple article, said machine constituting their full equipment in their plating department; realizing this existing condition also knowing that said manufacturers frequently desire to electro-plate miscellaneous material, they have designed this machine so that it can be converted into an ordinary still plating tank in a very few minutes by simply raising the chain and attachments, making it possible to have two complete equipments in the one machine.



MEAKER COMPANY'S AUTOMATIC PLATING MACHINE.

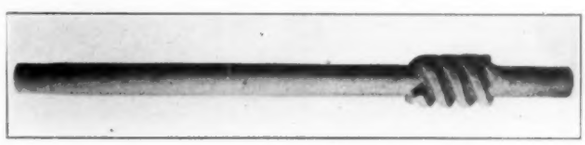
Material electro-plated in this machine receives a uniform coating, either a light or heavy deposit as is desired, for the reason that the deposit is controlled by speed of conveyor chain which can be varied. The pieces are hung in at one end of tank on copper hooks extending from chain, passed through plating solution, and they are then automatically raised up and out of machine and lowered into hot water rinse tank, again raised and automatically discharged on truck, plated, rinsed and dried. As shown in the cut material is fed vertically through machine between rows of anodes, and this cathode arrangement prevents any part of the work being shaded by contact points or sliding contacts, and further avoids pocketing of hydrogen gas as is the case when goods are conveyed through any plating solution horizontally. It is a well-known fact that hydrogen gas clings to the bottom of flat surfaces but the anode and cathode arrangement in this machine avoids this bad feature.

While goods are being plated they are always in plain view of the operator, and pieces can be taken out, examined, and put back without loss of time. This feature also makes it possible to immediately detect improperly cleaned work. Another strong feature is that all mechanism is above the solution; any part can be taken off and repaired without taking the solution out of the tank, so the time lost by repairs is kept at a minimum. Electrical contacts are made of bus bar copper, and all sliding contacts are automatically kept clean, so there is no arching or loss of current. The anode rods are connected by flexible cable and are arranged so that they can be adjusted the proper distance from the work, making it easy to get a very high current density without excessive voltage consequently without waste of power. The Meaker self-sustaining, electro-galvanizing solution, especially adapted for this machine because of its high current density, makes it possible to deposit a four test coating of zinc in ten minutes time. Further particulars are contained in catalogue which can be obtained upon request.

CHROMAX BRONZE, A NEW ALLOY

A new product in the field of alloys is chromax bronze, now being put upon the market by the Naulty Smelting and Refining Company, Ltd., Philadelphia. This metal is an alloy of chromium, copper and nickel, and some very extensive claims are made for it by the makers. Some of these are as follows:

They claim to be the only people who have successfully introduced chromium into copper and its alloys, which process is fully protected by two United States patents. While chrome-nickel steel is today recognized as the best steel, they claim this bronze to be superior to any other, it being a chrome-nickel bronze. They say, "As a bearing metal it is the best in the world, having a peculiar oily nature which necessitates the use of less oil than other metals. It is also a high fusing metal (fusing point 1200 degs. Fahr.), and we guarantee that it will not fuse nor cut, even if run red hot from friction, which we have proven by actual tests. We also claim this bronze will stand 20,000 pounds pressure per square inch on a 6-inch bearing surface at slow speed, which is at least ten times more than any other bronze will stand. It will take on a high polish and will not crystallize.



SHAFT MADE OF CHROMAX BRONZE.

"It has a tensile strength of 79,000 pounds per square inch, with an elongation of 3.3%, and because of the extreme density of this metal it makes the best bronze for gears, especially when used against steel. In some cases it is superior to steel gears, as steel under great pressure is apt to crush out, while chromax bronze will condense and become stronger. It is also positively acid proof, having been tested and now being used in some of the largest dye-houses and finishing works in the United States.

It is also superior to any other bronze for mining machinery, such as valves, plungers, etc, and on large sugar refining machines or anything subjected to acid conditions. This metal is also non-corrosive and not affected by the action of salt water, making it invaluable for marine use, such as ship propellers, ship equipments, plates, etc. On a 5/8-in. bar it stood a spring rebound test of five tons. This bronze can be rolled into sheets and wire. In sheets we claim that in some cases it is superior to sheet steel. It can be used in place of steel in ladies' corsets and will not rust. This metal will also make the toughest and hardest shafting on the market."

The shaft shown in cut is made of chromax bronze and is in use at the plant of the Pond Machine Tool Works, Plainfield, N. J. This shaft was made to replace one made of a high-grade steel which failed. The manufacturers will be glad to receive requests for their Pamphlet "CB". Address Naulty Smelting and Refining Company, 2616 Martha street, Philadelphia, Pa.

ROLLED STEEL FLASKS

The Sterling Wheelbarrow Company, Milwaukee, Wis., are putting out on the market a line of flasks, wheelbarrows, tool boxes, etc., made of rolled sheet steel. The flask shown in the cut is a sheet steel snap flask for which the company claim the following advantages: Lighter, cheaper than cast flasks, there are no breakage or repairs, is superior to wood flasks, and has no equal for either bench or machine work.

The material from which the flasks are made is a special rolled steel section controlled exclusively by the company and protected

STERLING ROLLED SHEET STEEL SNAP FLASK.

by patents. The section consists of a ribbed channel and a continuous piece is bent into the desired shape and size, and mounted with malleable iron pin holders riveted to place and fitted with pins in such a manner as to enable a foundryman to change his flasks to as many parts as he desires. These flasks are made in a wide range of sizes and shapes. The style E shown in cut is a snap flask, but the company particularly specializes in the manufacture of tight flasks rectangular and round. Further information will be furnished upon application to the company for catalogue F-1.

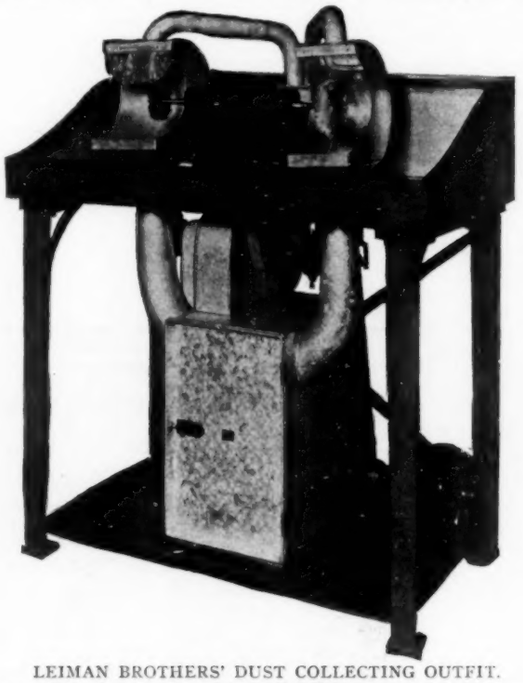
FLUXES—TENSILITE

The Cleveland Tensilite Company, of Cleveland, Ohio, have placed upon the market a material for the fluxing of metals, including brass, bronze and gun metal, which they call Tensilite. This material is styled an assimilator and purifier for all of the ferrous and non-ferrous metals by the manufacturers. According to the circular T-1 sent out by this company the following claims are made fo rthis material: It prevents dross and oxidation, saving two or three pounds of metal to every hundred pounds melted, which saving alone adds 2 per cent. or 3 per cent. profit on every job in which it is used. It thoroughly eliminates iron and other impurities from heats containing turnings, borings, sprues, etc., making the metal bright and clean. It prevents porosity and increases the fluidity of the metal and does not interfere with any mixture. It makes the metal more homogeneous and practically perfect in density, tensile strength, machine and high finishing qualities.

It permits the use of more scrap and is equally adapted to brass, bronze and gun metal. It livens up dull and sluggish metal, making it run easily. Tensilite is used in the ratio of one pound to every one hundred pounds of metal. For the convenience of users it is put up in one pound briquets, scored in quarter pound squares. This prevents the necessity of weighing it out and saves time, trouble and waste.

DUST COLLECTING OUTFIT

A new polishing outfit, shown in cut, with a dust collecting arrangement combined has just appeared, but with a feature that has heretofore never been embodied in an exhaust outfit. This feature is the utilization of the air after it has passed through the blower and is on its way out into the open air again. When it reaches that point where it would ordinarily pass out as free air it is turned back into the machine again at the dust hood, creating a perfect cyclone which seizes all loose particles which would escape from all ordinary machines using the suction only, and draws them with irresistible force into the separator cabinet underneath the machine. The particles are then separated from the air in this cabinet, and the purified air passes on out and around in the same circuit to entrap any other stray particles as



LEIMAN BROTHERS' DUST COLLECTING OUTFIT.

before. This forms a complete circuit of suction and pressure, using an otherwise wasted force for doing more work with the same amount of power as though it passed the air out into the room or out of the window.

Needless to say this feature is finding a great reception among polishers as it absolutely safeguards the health and keeps the shop clean with the same amount of power and expense as though the old style machine was being used. No dust can possibly escape, as anything which might continually pass through the cabinet without being caught would travel the circuit over and over again without finding its way out into the room. But such a contingency is beyond a possibility, and hence provision is made for an outlet in case it should be found desirable to pass some of the air out as in the old style.

This outfit is complete in itself and has no connection to flues, windows, or anywhere except to the driving shaft for power or to the electric circuit in case a motor is used. Should anything be dropped into the machine it does not reach the blower, but goes directly into a receptacle made especially for the purpose, although such a thing as dropping an article into the machine is well guarded against. The system of suction and blowing which is embodied in this outfit is well protected by patent applications on the various features connected with it.

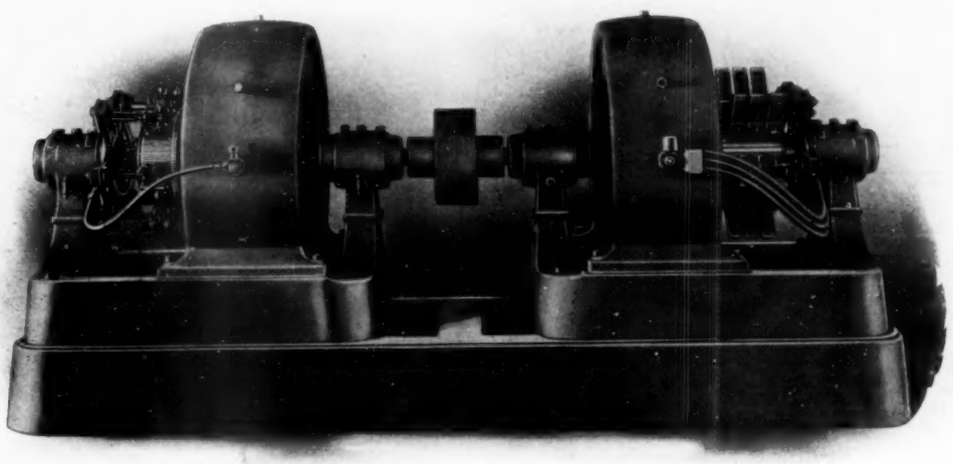
When used by workers in precious metals absolutely all the metal particles are saved thus often increasing the value of the sweeps to such a degree as to pay for the outfit entire in a very short time regardless of the amount of power saved. Thus we have the cardinal features of the machine, namely, doubling of efficiency, saving in cost of operation, increased value of the sweeps and absolute cleanliness and healthfulness of the working conditions. Full information is contained in pamphlets mailed upon request by the manufacturers, Leiman Brothers, 62-J John street, New York, N. Y.

ELECTRICAL MACHINERY

The Backus & Leeser Company, 410-412 West Thirteenth street, New York, manufacturers and dealers in all kinds of platers' and polishers' supplies, have recently been appointed selling agents for the Eager dynamos for electro-plating, electro-cleaning and galvanizing purposes. This line of apparatus, which was put on the market about five years ago, has steadily gained the favor of platers and galvanizers, and is now preferred by many of them on account of certain features described below. A complete line of dynamos, from 60 amperes up to 3,000 amperes, is manufactured, and the Backus & Leeser Company will carry a sufficient stock at their New York headquarters to meet almost any requirements promptly.

Beginning with the "60 ampere plater," and up to and including 300 amperes, motor type frames are used, with bearing brackets extending out from the magnet yoke. The bearings can be inverted and the machine hung upon the ceiling or side wall if desirable. This type is usually made with one commutator, but can be made with two commutators, if wanted.

The pedestal type machines include the 600 ampere size and larger, and are all made with two commutators, unless otherwise ordered. Connecting terminals are furnished for either two or three wire connectors. All machines are provided with a broad base and extremely rigid bearing pedestals, which, with a well balanced armature and low center of gravity, tends to make a noiseless and smooth running machine



DIRECT CONNECTED 1000 AMPERE 12 VOLT EAGER DYNAMO AND 25 H. P. DIRECT CURRENT MOTOR.

Eager dynamos are all provided with ring oiling bearings, incased in such a manner as to prevent any leakage of oil.

The brush holders allow free action of the brushes and have ample current carrying capacity. The current passes from the brushes to the cables, without passing through any loose joints, which reduces the resistance of the circuit to a minimum.

The commutators are built up with segments of pure copper, and are insulated with mica of uniform thickness. The thickness of the mica is proportioned to obtain uniform wear between the copper segments and the mica. The commutators are unusually large in proportion to the output of the machine.

The field coils may be wound for self-exciting or separate excitation from some external circuit, and the smaller sizes up to two thousand amperes can be furnished with compound winding for either self or separate excitation.

Two thousand ampere machines and larger are usually wound for separate excitation, for two reasons: First, the low voltage generated in the machine itself is not sufficient to cause enough current to pass through the field coils for proper and economical excitation. Second, a more uniform voltage can be maintained with separate excitation, as the external circuit is not affected by load variations on the dynamo, practically an even field strength can be maintained, and in consequence a much more uniform voltage can be maintained at the dynamo.

The armatures of the smaller sizes of dynamos have the laminations directly supported by the shaft. All sizes that will permit are provided with cast iron spiders upon which the laminations are supported and are pressed together and held in place by heavy cast iron end plates. The windings are all well ventilated, and the larger sizes have openings in the core, which allow a free passage of cool air through the core and armature coils. The coils are taped and treated with oil and waterproof varnish, and baked at a high temperature before being placed in slots provided in the armature. The coils are of relatively large cross section, which affords the highest efficiency when operating at full load.

The Backus & Leeser Company also handles the Eager direct current electric polishing and buffing lathe, which is meeting with marked success, a notable instance being the installation made for J. B. Wise, manufacturer of plumbing supplies, Watertown, N. Y., whose brass shop contains about a dozen of these lathes. Full information regarding these machines may be obtained from Backus & Leeser Company, Dept. P, upon request.

ALUMINUM PRIMER

Considerable trouble has been experienced when it was desired to apply paint or varnish to aluminum in that when the materials became thoroughly dry they would crack off and peel. In order to overcome this difficulty entirely, a new material has recently been put upon the market, and it is claimed by the manufacturers that it will obviate any difficulty previously experienced in the coating of aluminum, as it leaves the aluminum just as it was before the primer was applied. The primer compound as it is put out by a Bridgeport, Conn., company, consists of a very thin gum lacquer composition that will dry in a few minutes, and give absolutely no luster or shine to the work. On account of its chemical mixture, it takes hold of the aluminum and does not peel, chip or rub off, and when the aluminum has been dipped in it and dried, any kind of paint or varnish can be used on it either by brushing or dipping, and the primer leaving a gummy surface, gives a very good holding ground for different paints, and will not chip off or scratch.

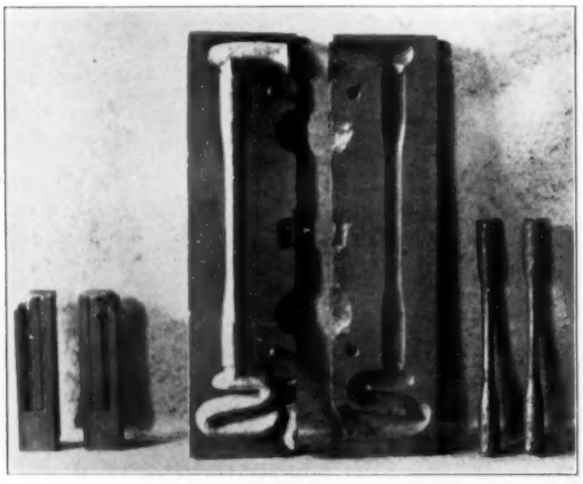
It can be applied over satin or polish finish. The primer being very thin, a gallon will cover several hundred square feet of aluminum surface. There are available no means of estimating exactly the number of square feet it will cover, but roughly it is calculated that a gallon, costing $2, would cover between 800 and 1,000 sq. ft. of surface. Figuring it down, it appears that 4 or 5 sq. ft. could be covered for a cent.

Further information can be obtained by writing to the American Lacquer Company, Bridgeport, Conn.

ACHESON-GRAPHITE PRODUCTS

GRAPHITE MOLDS.

The use of Acheson-Graphite Electrodes for the manufacture of molds permits of wide extension in casting metals. They are of solid graphite, nearly chemically pure, and are made in rods, blocks and slabs of various sizes, and the ease with which they can be cut and machined enables one to produce ingots in a variety of forms. In casting gold and silver and such metals, it has for many years been the custom to use iron molds. It is necessary, just previous to pouring the metal, to coat the mold with fine plumbago, lampblack, or with a film of oil to prevent the metal from adhering to the walls of the mold. The graphite mold not only offers the advantage of resisting high temperatures with scarcely any oxidation, but yields an ingot having a smooth, bright surface, and in addition to this, so far as is known, there is no case in which there is any absorption of the graphite by the molten metal.



MOLDS MADE OF ACHESON GRAPHITE.

Prof. Bancroft, in referring to the work of Shepard & Upton in determining the tensile strength of copper-tin alloys says: "It seems to me that graphite molds are very desirable for all small castings, whether of bronze or brass. The molds are easy to make, last a long while and give a good surface, so that the castings need little or no finishing." In this work the graphite was found ideal; it is easily worked and takes a beautiful surface, and the cast pieces come out so smooth and accurate that machining is unnecessary, and for such accuracy as this kind of work involved, were found relatively durable, one mold being found good for seventy-five to two hundred castings—depending upon the care exercised. In a mold having thin walls, if a piece is left too long to contract in it, it may crack the walls or break off the corners. There has also been developed a use for graphite molds in glass work.

GRAPHITE STIRRING RODS.

Acheson-Graphite Stirrers of any desired shape or size can be made from the solid rods and bars, owing to the ease of machining. They cause no contamination of the molten metals such as copper, brass, aluminum, tin, zinc, etc., and can easily be made to fit any style of holder. Being the purest, most stable form of carbon, they will reduce any oxides of the metals present, and in the case of copper and brass castings, give great purity and highest electrical conductivity.

GRAPHITE PHOSPHORIZERS.

Phosphorizers, or so-called chargers used for the introduction of phosphorus into bronzes, can easily be made of this material, and are superior to the natural graphite articles used for both this purpose and stirrers, because the latter are made of powdered or flake graphite and clay bond, both of which usually have objectionable impurities contained and are added to the metal.

GRAPHITE CRUCIBLES.

For assaying or other laboratory purposes, pure Acheson-Graphite crucibles can easily be turned up on a lathe from the solid rods or blocks, and in high temperature work particularly, are found indispensable. They are especially valuable for melting the precious metals, and in all work where the introduction of impurities must be avoided. In a neutral or reducing atmosphere their efficiency is far ahead of any other form of crucible. As an instance of the lasting qualities of crucibles made from Acheson-Graphite Electrodes, a company doing business in Detroit and Chicago reports making ten or more melts at a temperature of 2,000° C. without material wear, and say "We have taken no special pains to keep these from the air at this high temperature."

In the melting of various alloys, from twelve to eighteen melts have been reported as showing very little deterioration of the crucible in an oxidizing atmosphere, although they are not recommended for this class of work unless done in a neutral atmosphere. All of the above products are manufactured and sold by the Acheson Graphite Company, Niagara Falls, New York, who will send booklet 402-U and descriptive literature upon request.

FINISHES BY SPRAYING

W. J. Smart, president of the Eureka Pneumatic Spray Company, New York, is putting out some novel and interesting metal finishes, which he accomplishes by means of the pneumatic spray apparatus manufactured by this company. One of the finishes is known as Light Statuary Bronze, and according to Mr. Smart's description the finish is easily made by the use of compressed air and the Eureka and Record models of air brushes as follows: If the article is made of iron it should be smoothed up on the high lights and the form of the figure with fine emery, but no file marks or scratches should show. A spelter casting requires little more than the brushing up of the seams or at least less smoothness is required on the face and form than with cast iron.

Where the figure is of iron Eureka tan color enamel should be sprayed on the article direct beginning in the out of the way parts of the figure or group. Having covered them, spray the portions which are more prominent and accessible. Set away to dry a few hours and apply two more coats. In spraying it is well to remember that the size of the spray should be governed according to the size of the article being sprayed. For some work the Model B Record sprayer will be found most desirable, for larger work the No. 1 Eureka sprayer will be more suitable.

Having permitted the final coat to dry over night, little more is required than simply to moisten a piece of piano felt or folds of bed ticking with turpentine. The article may be gently, yet briskly, rubbed over all smooth parts and high lights. Then wipe off with a soft cloth or chamois and a finish will be found which looks just like the real bronze figures such as you will see on sale in the Fifth avenue and other high grade art stores.

When the article is made of spelter it is desirable to spray a coat of lacquer on same before applying the enamel. This description is not difficult to understand and is not lengthy, yet the writer feels that this finish is something which will be highly appreciated, which not alone will be found valuable on statuettes, etc., but decidedly attractive for chandeliers, portables and many other articles of manufacture.

It is impervious to water and may be washed and scrubbed at will. Soap and alkali have no action on it, but simply improve the appearance the more it is washed and handled; whereas bronze statues are ruined from handling or rubbing. Dirt and grime cannot strike into this enamel finish, and the color being a pigment is sun-proof and permanent. Ordinary plaster casts will take the same finish with the same beautiful results, this being a finish made entirely with the material and process employed, depending in no way upon any chemical action with the metal or other material of which the article is made. The Eureka Pneumatic Spray Company have a demonstrating outfit installed in their premises where samples may be finished in any way that their customers may require.

Any further information desired by the readers of THE METAL INDUSTRY may be found in this Pamphlet L-1 or will be cheerfully given if correspondence is addressed to the Eureka Pneumatic Spray Company, 276 Spring street, New York.

A FURNACE DEVICE FOR POURING DIRECTLY INTO MOLDS

The ordinary tilting or rotary furnaces as heretofore constructed have been mounted on trunions in such a manner that as the furnace body is partially rotated in the act of pouring, the pouring spout of the furnace will describe an arc in accordance with the swing of the furnace, thereby depositing the metal at different points. On account of the shifting movement of the pouring spout, the ordinary furnace is not adapted to pour the metal directly into the molds, it being necessary to shift the receptacle in or out to catch the flow and making it impossible to pour evenly into a small opening. The usual custom is to pour the metal from the furnace into a heated ladle or crucible, and then to pour (or transfer) the metal from the ladle into the molds or chills. This second handling of the metal is objectionable, as the metal loses considerable heat during the transfers, and it must be brought up to a temperature considerably higher than is required if poured direct without transferring.

To meet this problem, the Rockwell Furnace Company, of 26 Cortlandt street, New York, has brought out the furnaces and operating device herein described, melting with or without crucibles, using oil or gas fuel, which is the invention of W. S. Quigley, vice-president of that company, and for which patents are pending, and which solves the afore mentioned difficulty by the mounting of furnaces so as to tilt or revolve around their pouring spouts on an axis passing transversely through the pouring spout so that the metal always flows from a fixed point, and that the whole contents of a furnace can be poured into an opening less than 2½ ins. in diameter at any desired speed increased or decreased at the will of the operator, who can instantly raise, lower or lock the furnace in any position.

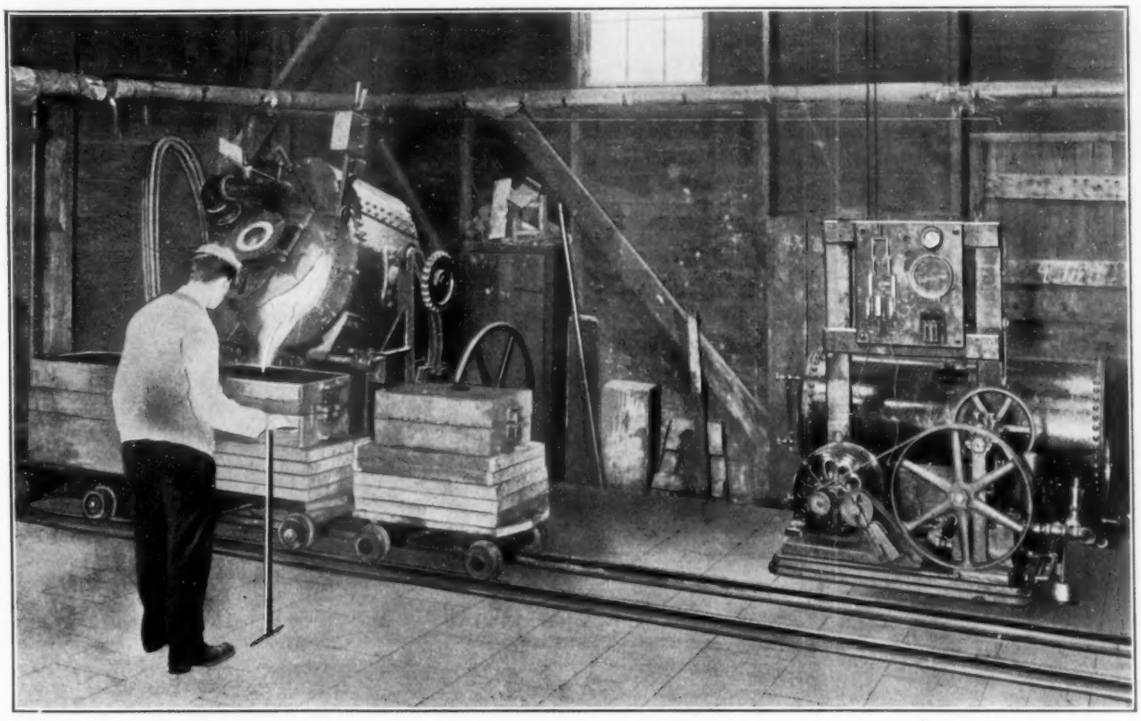


FIG. 1. THE FURNACE AND ITS LIFTING EQUIPMENT.

The furnace, Fig. 1, which at first glance looks like the standard Tilting Crucible Furnace (the open flame furnace not being shown, but which is handled in the same manner), is mounted on trunions and may be revolved by hand same as the ordinary furnace for charging, mixing, skimming, and, if need be, for pouring into a ladle or crucible in the regular manner by aid of the hand wheel.

The lifting device shown in Fig. 2, which is a simple hydraulic ram, the speed of which in either direction is controlled by the hand lever shown in the foreground which operates a balance valve which regulates the flow of water into or out of the lifting cylinder. The water pressure for operating is supplied by a small hydraulic pump shown. The power here shown is supplied by a 2 h. p. electric motor, which will operate three to five furnaces, but the pump may be belt driven from line shaft if preferred. The fuel, which may be oil or gas, is conveyed to the furnace, through telescopic pipes which permit the furnace to be operated in any position.

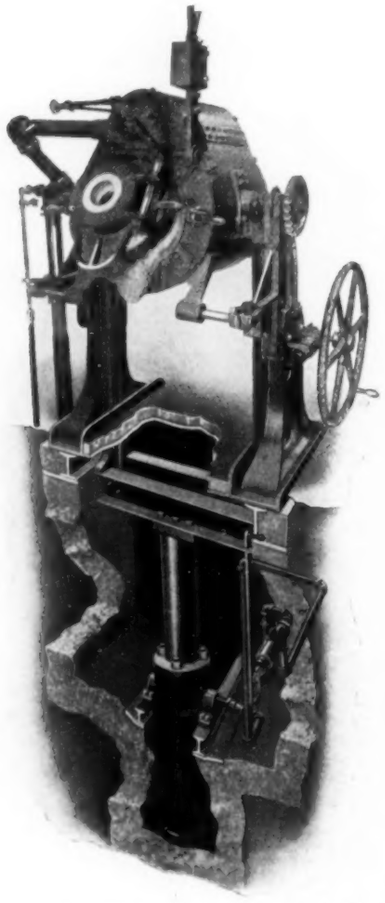
The switch and pressure controlling device shown on the panel above the motor and pump, Fig. 1, automatically maintains a uniform pressure of between 80 to 100 lbs. in the tanks shown in the background. The exhaust water or waste from the cylinder flows back to an open tank on which the reservoir rests and is used over and over again, the only loss being evaporation. To prevent freezing in the winter, when there is a liability of a considerable drop in the temperature nights or Sundays, a solution of 3 lbs. calcium chloride to each gallon of water will withstand a temperature of 10 degs. Fahr. below zero, or, if preferred, oil may be substituted for the water.

The furnace, pouring as it does directly into the flask, cannot be used to its greatest efficiency unless the molds or chills are carried from the molding machine to the furnace, and after being poured are carried away. This is done by a system of tram rail or an endless belt or chain conveyor. By means of this tramrail or conveyor the man at the molding machine places the molds or chills on trolleys or conveyor, and as fast as the machine makes the mold the flasks are carried away to the furnace, arrangements having been made to accommodate different size molds. While still on the conveyor they are poured and are carried to the shaking out point.

If the castings are of such a nature that they can be shaken out out within a few minutes after pouring at this shaking point, an automatic trip, working by gravity, is provided and the flask falls on the grating. The sand passes through, the castings are thrown into a dump bucket, preparatory to going to the rumblers and the flasks are placed on the trolley or conveyor and carried back to the molding machine. The sand, as it passes through

the grating, falls into a hopper of a sand mixing machine, which undoubtedly is the best practice, or into a dumping bucket hung on a trolley or into a conveyor, and is carried away to a point where the sand is tempered before it is used over again in the molding machine. With the exception of the men used in tempering same, if done by hand, but three men are necessary for this entire operation—the man at the molding machine who makes the molds, the man who pours the molds by means of the lifting tilting furnace, and the man at the shaking out point.

Contrasting with the old method of operating and handling it will be seen that the minimum of labor is employed. The molding floor is entirely done away with, and the castings, sand and flasks are automatically conveyed to the point of the next operation. Should the nature of the castings be such that they must



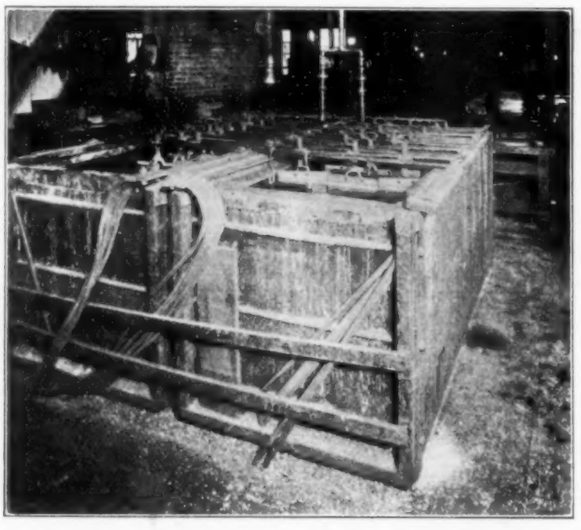
SHOWING THE HYDRAULIC LIFTING CYLINDER.

remain in the flasks for several hours or more before shaking out, then, after the poured flasks leave the furnace they are automatically carried to what may be called a storage floor, where, by means of a quick acting, though perfectly controlled, lever dropper, they are lowered from the trolley rack and allowed to cool. When ready to be shaken out they are raised by means of the lever referred to, and shoved on the trolley into the conveyor, which carries them to the shaking out point where they are handled as described above.

The application of the system to brass mill casting shops makes an economical equipment for melting and casting. The molds are placed on racks which instead of being stationary are on a carriage and run past the furnace on a track. This will enable the casting of the metal with the molds either vertical or slightly inclined and using either pouring strainers or pouring directly into the molds. Rack carriages can be arranged in a pit to accommodate the various lengths of molds as well as for tube shell or core molds and bolt and wire bar molds. The easy manipulation of the molds for taking up the shrink is provided for.

LEAD LINED TANKS

The Chadwick-Boston Lead Company, of Boston, Mass. (whose advertisement of lead lined tanks appears upon another page), have been furnishing these tanks for many years for galvanizers', electro-platers' and general chemical use. Fifty years' experience has demonstrated that for the above purposes these lead lined tanks are superior as regards durability and cleanliness and if, even after many years, the use of the tank should be discontinued, the lead linings may always be disposed of at a good price as old metal.



LEAD LINED TANK INSTALLATION OF THE CHADWICK-LEAD COMPANY.

The seams are not soldered, but burned by practical lead burners, and will withstand the action of acids, chemicals, etc., as long as the lead itself. The tanks are thoroughly made by skilled mechanics and all work executed in a high-grade manner, as many satisfied patrons throughout the United States can bear testimony. For further particulars send for circular C-B.

PRODUCTS OF THE NIAGARA ALKALI COMPANY

The Niagara Alkali Company, Niagara Falls, N. Y., manufacturers of electrolytic caustic potash, solid and liquid chlorine and by-products, have nearly completed the new plant to take the place of the old Roberts Chemical Company, and they report will be in operation by January 1. They are manufacturing caustic potash, caustic soda and chlorine gas, utilizing the Biliter cell, as developed in Aschersleben, Germany, and Bruckl, Austria. This, they claim, is undoubtedly the best cell ever devised, being of a simple horizontal diaphragm construction, operating by percolation, doing away with the necessity of having a circulating brine system with its attendant objections and evils. The cathode liquor comes off at a fairly high concentration, about 18 per cent., and no oil or other inflammable material is used in connection with the cell. The cost of the cell is low and the current efficiency operating commercially about 97 per cent.

From the chlorine gas they manufacture muriatic acid under the old Roberts patent owned by them, producing the only muriatic acid absolutely free from sulphur and arsenic. They also liquefy a portion of the chlorine gas, having in operation through their associates, the best liquefying machinery for producing liquid chlorine in the United States. This branch of the business is handled by the Electro Bleaching Gas Company, 24 East Twenty-first street, New York City, N. Y. They are also arranging to engage in the manufacture of tin, chloride, carbon tetrachloride, potassium chlorate and bleaching powder. Another branch of the business will be the manufacture of acetylene tetrachloride, chlorides and oxychlorides of metaloids and zinc chloride.

Associations and Societies

DIRECTORY OF AND REPORTS OF THE PROCEEDINGS OF THE METAL TRADES ORGANIZATIONS.

AMERICAN BRASS FOUNDERS' ASSOCIATION.

President, N. K. B. Patch, Toronto, Canada; Secretary and Treasurer, W. M. Corse. All correspondence should be addressed to the Secretary, W. M. Corse, 1155 Sycamore street, Buffalo, N. Y. The objects of the Association are for the educational welfare of the metal industry. Annual convention with the American Foundrymen's Association in a succession of cities as invited. The next convention will be held May 23-26, 1911.

Secretary Corse reports that: "The membership of the American Founders' Association, reported at the Cincinnati convention, 1909, was 206. The number of members at the Detroit convention, June, 1910, was 273, showing a net gain of 33 per cent. During the year we sent out about two thousand letters, and our vice-presidents also sent out several hundred. We have added to our list of members a number of prominent scientific men, which ought to strengthen our membership considerably.

"The standardization committee, appointed at the Cincinnati meeting, has gotten under way and its report shows that some good work is being done in connection with the Bureau of Standards at Washington. Our secretary is planning to keep in close touch with the American Chemical Society and the American Society for Testing Materials on the matter of standardization of methods for analyses of non-ferrous alloys, so that the maximum benefit may be derived from this work. It was decided to ask some of the members of the American Brass Founders' Association to furnish samples and others to co-operate in compiling methods of analysis. The rolling mill sample was furnished by the Bridgeport Brass Company, of Bridgeport, Conn., and the sand casting sample by the Lumen Bearing Company, of Buffalo, N. Y. These were forwarded to Washington and are now in process of preparation. Letters were written to various metallurgists, both in our membership and outside, and copies of methods were obtained from the following: American Brass Company, American Locomotive Company, National Cash Register Company, Lumen Bearing Company, A. D. Little, Inc., Nathan Manufacturing Company, Detroit Testing Laboratory, and Laboratory of Bureau of Steam Engineering. These were furnished to the members of our committee and to Dr. Hillebrand at the Bureau of Standards.

"Numbers of requests have already been received at Washington for these standard samples, and it would seem that the work, when completed, is going to be of considerable interest and value.

"The association is now issuing a monthly Bulletin, in order that the members may be kept in close touch with affairs. This bulletin carries abstracts from the American Chemical Society, making it doubly valuable. It has also been decided to furnish the members with a bound volume of the transactions, in addition to the pamphlet sets sent out during the year, at a cost of $1. Copies of the papers read at the Detroit convention, with the exception of Mr. Lane's, have been sent to all members whose dues have been paid. As fast as the members who are in arrears pay up, they will receive copies of these papers.

"The Executive Committee of the American Brass Founders' Association, after careful consideration, have appointed Arthur D. Little, Inc., 93 Broad street, Boston, Mass., official chemist for the association. This arrangement carries a number of benefits for our members:

"First—Arthur D. Little, Inc., have made a special rate on analyses of non-ferrous alloys for members only.

"Second—Arthur D. Little, Inc., will prepare for the convention a review of the progress of the industry and will also submit a paper of interest at that time.

"Third—Arthur D. Little, Inc., expect to employ in the near future a research chemist on non-ferrous metals and alloys, whose services will be at the disposal of the members of the American Brass Founders' Association at reasonable rates."

AMERICAN FOUNDRYMEN'S ASSOCIATION.

President, Joseph T. Speer, Pittsburg, Pa.; Secretary and Treasurer, Dr. Richard Moldenke, Watchung, N. J. All correspondence should be addressed to the secretary, Dr. Richard Moldenke, Watchung, N. J. The objects of the Association are for the educational welfare of the iron and metal industry. Annual Convention the latter part of May or early in June each year, in a succession of cities, as invited. The Convention of 1911 will be held May 23-26, 1911.

Secretary Moldenke reports on the progress of his society as follows:

"Our association has been busy as usual, this office reflecting a condition which looks much like an industrial 'putting the house in order' for what may be coming. Large and small concerns are looking toward saving in their works practice, and I have been called away much during the last six months to straighten out kinks in the practice of concerns whom fierce competition has awakened. We have been busy getting out our Transactions, about 300 pages having been sent out to the membership so far. The balance of the minutes of the Detroit Convention will be out shortly, and we hope to have a substantial bound volume of 600 pages to send to the membership at the end of the fiscal year.

"In the meantime, the tests on molding sand are progressing, and studies on the mineralogy of the eighty samples we have now received are under way. The analyses are about complete, and the physical tests will commence in a few weeks. Preparations for the next Convention have begun already, and will be pushed actively after the first of January. Indications seem to point to a slack business year ahead of us, which always means a heavy year in the way of foundry advance, as we have time to do some thinking where it is most needed."

INSTITUTE OF METALS

President, Sir Gerard Muntz, Bart.; Treasurer, Professor Turner, M. Sc.; Secretary, G. Shaw Scott. All correspondence should be addressed to the Secretary, G. Shaw Scott, M. Sc., Institute of Metals, Caxton House, Westminster, S. W., London, England. The objects of the Institute are for the educational welfare of the metal industry.

The annual general meeting of the Institute was held at the Institution of Mechanical Engineers, Storey's Gate, Westminster, S. W., January 18, 1911.

The following is a list of the papers submitted at the meeting:

(1) Professor H. C. H. Carpenter, M.A., Ph.D., and C. A. Edwards, Esq., M.Sc., on "A New Critical Point in Copper-Zinc Alloys; Its Interpretation and Influence on Their Properties," with an Appendix by C. A. Edwards, Esq., M.Sc., on "The Nature of Solid Solutions."

(2) Engineer Rear-Admiral J. T. Corner, C.B., on "Some Practical Experience with the Corrosion of Metals."

(3) H. J. Humphries, Esq., and Professor C. A. Smith, M.Sc., on "Some Tests on White Anti-Friction Bearing Metals."

(4) Professor A. McWilliam and W. R. Barclay, Esq., on "The Adhesion of Electro-Deposited Silver, in Relation to the Nature of the German Silver Basis Metal."

(5) G. D. Bengough, Esq., M.A., will present his Preliminary Report to the Corrosion Committee on "The Present State of Our Knowledge of the Corrosion of Non-Ferrous Metals and Alloys, with Suggestions for a Research into the Causes of the Corrosion of Brass Condenser Tubes by Sea-Water."

The annual report of the Council for the year 1910 was presented also at the meeting and showed the following as to membership. The number of members on the roll of the Institute December 31, 1910, was as follows: Fellows, 1; Honorary, 3; Original (those who joined prior to July 1, 1909), 438; Ordinary, 86, and student members, 23. Total, 551.

Regarding the progress of the Institute and what it has accomplished during the past year, the report says:

During 1910 four meetings were held. The annual general meeting took place in London on January 18 and 19, the retiring president (Sir William H. White) occupying the chair prior to the declaration of the result of the ballot for the Council for 1910, after which Sir Gerard A. Muntz, Bart., assumed office as president, and delivered his presidential address.

A PATHOLOGICAL MUSEUM OF METALS.

During the year under review there was established at the offices of the Institute, Caxton House, Westminster, S. W., a pathological museum of metals, tending to show how non-ferrous metals and their alloys may fail in use. The first contributions to the museum were received from the president, and subsequently several members were good enough to add to the collection. The Council hope that additional donations will be made to the museum by members. Cases for the housing of the specimens were presented by the president, Dr. Beilby, and Mr. Boeddicker.

PUBLICATIONS.

Three volumes of the Journal were published in 1910—Volume II. being issued to members in February, Volume III. in June, and Volume IV. in December. These contained 1,100 pages of letterpress, plates, and numerous illustrations in the text. The Council are convinced that in the Journal the Institute possesses a valuable record of metallurgical progress. The Council feel that the value of the Journal is being appreciated, as the sales of copies of the Journal, both to members and non-members, are increasing very rapidly.

LOCAL SECTIONS.

A notable development that took place during the past year was the sanction given by the Council to the formation of Local Sections of the Institute. The first of these sections has been formed in Birmingham, and the first meeting of this section took place on November 22, when a lecture was given by Mr. O. F. Hudson, M.Sc., on "An Introduction to Metallography." The chairman of the local section (Mr. G. A. Boedicker) presided.

CORROSION COMMITTEE.

Realizing the vast importance to manufacturers and users of the non-ferrous metals of a knowledge of the causes and methods of prevention of the corrosion of non-ferrous metals, the Council appointed a special committee "for the purpose of furthering the study of the cause or causes and prevention of the corrosion of metals and alloys coming within the purview of the Institute of Metals."

NATIONAL ASSOCIATION OF BRASS MANUFACTURERS.

President, Theo. Ahrens, Louisville, Ky.; Commissioner, William M. Webster, Chicago, Ill. All correspondence should be addressed to the Commissioner, William M. Webster, 1112 Schiller Theater Building, Chicago, Ill. The objects of the Association are to promote in all lawful ways the interests of firms engaged in the manufacture of brass goods. Meets every three months. Each meeting fixes the place and date of the meeting to follow, consequently there is no stated place. It has been customary for the Association to hold its Annual Meeting in New York City in December of each year. The Semi-Annual Meeting is generally held at Atlantic City or some other Sea Coast town. The next meeting will be held in Chicago, Ill., March, 1911.

The annual meeting of this association at the Hotel Astor, New York City, on December 13 and 14, and which from point of attendance and matters accomplished was one of the most successful meetings held in years. New members were elected; a committee appointed to take up with the pottery and enamel iron manufacturers the question of standardizing openings and threads and appointed a committee to take up with the authorities in Washington the question of establishing uniform measures and threads.

The following officers were elected for the ensuing year: Theo. Ahrens, Louisville, Ky., president. Trustees: A. S. Hills, Haydenville, Mass.; W. H. Wasweyler, Milwaukee, Wis.; C. C. Hale, New Haven, Conn.; D. H. Roberts, Detroit, Mich.; F. Somerville, Toronto, Canada; J. W. Sharpe, Jr., Philadelphia, Pa.

The meeting adjourned to meet in Chicago, Ill., in March, 1911.

Commissioner Webster, in commenting upon the work of his society for the year 1910, says:

"We have a number of features that we have more or less successfully handled.

"1st. Is the adjustment of the present railway classification to intermediate territories and Pacific coast and North coast terminal points and a similar petition is now docketed, and we hope to successfully terminate in the territory covered by the Official and Southern Classification Association. These adjustments of tariffs and freight rates ultimately pertains to the net freight rate which is invariably paid by the manufacturers—consequently any saving in this direction means an increased profit to them.

"2d. The standardizing of threads, sizes and different measures applying to the various classes and kinds of goods, lavatory-traps and other fixtures.

"3d. During the past year we have spent some considerable time, and I think advisably, on the question of costs, on the proper methods of arriving at costs and of fully informing and thoroughly advising our people and those engaged in the brass business, what their costs really are, for it goes without saying that no man will sell his goods at less than cost or give away with his sale, a part of his hard-earned capital, if he knows it.

"4th. We have also had a variety of discussions and many practical illustrations of the modern methods of making goods, equipments for the different branches of the business, which has been highly educational and much appreciated by those engaged in the business.

"5th. Along the lines of the march of progress, we have also materially increased our membership during the year just closed—so that with a feeling of pride and satisfaction, I conclude this letter with the statement that the National Association of Brass Manufacturers was never so large numerically, or never so strong financially as it was at the close of the year 1910."

MANUFACTURING JEWELERS' ASSOCIATION OF NEWARK, N. J.

President, George R. Howe; Treasurer, J. M. Riker; Secretary, Harry Durand, all of Newark, N. J. All correspondence should be addressed to the Secretary, Harry Durand, 49 Franklin street, Newark, N. J. The objects of the Associa-

tion are for the commercial welfare of the manufacturing jewelers of Newark. No regular meetings are held, but the Association is governed by a Board of Managers, who meet at the call of the President.

ASSOCIATED FOUNDRY FOREMEN

President, Robert B. Thompson; Secretary and Treasurer, Hugh McPhee. All correspondence to be addressed to the Secretary, Hugh McPhee, 50 Cottage Place, Tarrytown, N. Y. Annual Convention with the American Foundrymens' Association.

The secretary reports "our aim for the coming year will be along instructive lines whereby we may be able to benefit all the foundry foremen and pattern workers connected with the trade, by means of lectures, and exchanging of ideas between the members and any other way by which the association can benefit its members either in the case of employment or educational lines. The work which has been done in the past year has been very satisfying, and we look forward to the coming year to one of great interest."

NEW ENGLAND MANUFACTURING JEWELERS' AND SILVERSMITHS ASSOCIATION.

President, Geo. H. Holmes; Treasurer, Wade W. Williams; Secretary, Frederick A. Ballou, all of Providence, R. I. All correspondence should be addressed to the Secretary, Providence, R. I. The objects of the Association are for the commercial and educational welfare of manufacturing jewelers and silversmiths.

THE FOUNDRY AND MACHINE EXHIBITION COMPANY

President, Geo. R. Raynor, Niagara Falls, N. Y.; Secretary, C. E. Hoyt, Lewis Institute, Chicago, Ill.; Treasurer, J. S. McCormick, J. S. McCormick Co., Pittsburgh, Pa. All correspondence should be addressed to the Secretary, C. E. Hoyt, Lewis Institute, Chicago, Ill. The objects of the Association are for the commercial and technical education of iron and metal industries by co-operating with all foundry and manufacturing interests in making an annual exhibit of supplies and equipments in conjunction with the meeting of the American Foundrymen's Association. The next exhibit and convention will be held in May, 1911.

NATIONAL MACHINE TOOL BUILDERS' ASSOCIATION

President, Frederick A. Geier, Cincinnati, Ohio; First Vice-President, Charles H. Alvord, Torrington, Conn.; Second Vice-President, Samuel H. Reck, Rockford, Ill.; Treasurer, Albert E. Newton, Worcester, Mass.; Secretary, Charles E. Hildreth, Worcester, Mass. The objects of the Association are to promote the interests of machine tool builders in the direction of good fellowship and the liberal discussion of subjects relating to the improvement, standardization of parts and methods of manufacturing machine tools. The Association meets annually in the Fall in New York City and semi-annually in the Spring at places selected by vote of the members at the annual meeting. Correspondence should be addressed to the secretary, Chas. E. Hildreth, Worcester, Mass.

During the past year the association increased in membership over 50 per cent., so that it now comprises over 80 per cent. of the entire machine tool industry of the country. The coming year will be devoted to the usual instructive discussion of subjects pertinent to the trade, but especial attention will be paid to becoming better acquainted personally both among the older members and the large number of new ones admitted during the year.

NATIONAL ELECTROPLATERS' ASSOCIATION OF THE UNITED STATES AND CANADA

President, Charles H. Proctor, Arlington, N. J.; Treasurer, H. H. Reama, New York, N. Y.; Corresponding and Financial Secretary, Geo. B. Hogaboom; Recording Secretary, Royal F. Clark. All correspondence should be addressed to the Corresponding Secretary, Geo. B. Hogaboom, 656 Hunterdon St., Newark, N. J. The objects of the Association are to promote the dissemination of knowledge concerning the art of electro-deposition of metals in all its branches. Meets at Grand Opera House Building, 309 W. 23d St., on the fourth Friday of each month, 8 p. m.

The twenty-third meeting of this association was held at its regular meeting place on Friday, December 23. The following were elected to active membership: Henry Leggert, Walter J. Johnson, H. A. Barry, William Albert, G. H. Cartlage, W. S. Kurrly, J. F. Fleckenstein, N. P. Miller and E. Blassett. The reading of the charter to be granted to the Philadelphia Association was postponed until the January meeting. Several interesting papers were read, among them being an article on "Silver Plating on Casket Hardware, the Plater and His Formula," by G. B. Hogaboom, and a paper on "The Over-Concentration of Solutions."

The fourth regular meeting of the Philadelphia branch of the association was held on Friday, December 30, at Dooner's Hotel, Philadelphia, Pa. At this meeting Hugo Hermanns gave an interesting talk on "Acid Copper Plating," exhibiting samples of work, and considerable discussion followed the reading of the paper. It was decided that the Philadelphia members attend the second annual banquet of the association to be held in New York, February 11, and to receive their charter from the parent organization at that time.

Recording Secretary Royal F. Clark reports on the progress of the association for the past year. The membership now numbers about 150, and since May 1 it has gained 57 members. Two quarterlies have been issued, comprising the proceedings for six months of the year. A branch of the association has been organized in Philadelphia and a charter has been granted to it. An information bureau has been established and has helped 52 different members with valuable information, and the employment bureau has placed eight members in good positions. A laboratory, equipped for research work, is to be maintained by the association in the near future. Twelve meetings have been held during the year at which the attendance has been remarkably good, and interesting discussions upon various subjects relating to the plating industry have been enthusiastically entered into. An important amendment was made to the constitution in November, when it was voted unanimously to grant to associate members the right to vote and express opinions upon all subjects of discussion.

The banquet and smoker that were held during 1910 were instrumental in promoting good fellowship among the members and also others who, though not members, are interested in the deposition of metals. The association has done a great deal to bring the plater "out of his shell," which was one of the prime objects of its formation. It can be noticed at each meeting that more members are preparing and reading papers, thus showing how the movement is taking hold and broadening the ideas of the trade at large. The recording secretary is of the opinion that the standardization of formulas and finishes should be one of the special subjects to be taken up during the coming year. One of the objects to be striven for by the association during 1911 will be to obtain new members and to organize branches in other parts of the United States and Canada. By the issuing of quarterly reviews and allowing associate members the privilege of the floor, it should bring forth more from those who stand for the objects of the association—the dissemination of knowledge concerning the art of the electro-deposition of metals in all its branches.

ITEMS OF INTEREST TO THE INDIVIDUAL.

A new position has been created at the plant of the Nathan Manufacturing Company, 416 E. 106th street, New York, by the appointment of Frank Anthony as general manager. Mr. Anthony is a brother of the A. R. Anthony who is now proprietor of the Anthony Company, manufacturers of the "Anthony Furnace." Another recent position at Nathan's is the appointment of A. Best as mechanical adviser to the president. W. L. Abate remains as superintendent and M. Kassander as mechanical engineer. The executive officers are: Alfred Nathan, president; M. Mack, secretary; Morris Stellheimer, assistant secretary. The company are large manufacturers of brass goods.

Recent changes in the personnel of the producing department of the Michigan Copper and Brass Company, manufacturers of brass, copper, bronze, german silver in sheets, plates, wire, rods and tubes, Detroit, Mich., are that John Tyler, mill superintendent for the past six years, and H. A. Higgins, master mechanic, have severed their connection. B. F. Brusstar, formerly mill superintendent for the Winchester Arms Company, New Haven, Conn., has taken the position of general superintendent, and David Burgess, who was also connected with the Winchester Arms Company, has become master mechanic.

The Perkin Medal has been awarded to Charles M. Hall, the inventor of the process generally used in this country for making aluminum. The medal, which is of gold and octagonal in form, will be presented to Mr. Hall, who is connected with the Aluminum Company of America, at a meeting to be held in New York by the interested bodies.

Charles S. Taylor, president and treasurer of the Boston Nickel Plating Company, platers and brass finishers of Boston, Mass., has recently been elected mayor of Medford, Mass., by a unanimous vote, and was the first mayor ever elected to that office without opposition. Mr. Taylor is the seventh mayor of the city and the third native son to become its chief executive and has the distinction of being a self-made man in every way.

Mr. George O. Thompson, who for a number of years was employed as foreman plater with The Garth Company and the Hemming Manufacturing Company, of Montreal, Canada, has left the employ of the last named company and accepted a position as foreman of the gilding and coloring department of a large manufacturing jewelry establishment in Toronto, Canada.

Robert Kann, analytical and consulting chemist and chemical engineer of 24 Cliff street, New York, has moved to 62-64 Gold street, where he will be associated with R. J. Wyser, who has been connected with the Carnegie Steel Works for a number of years. The increased laboratory facilities will enable them to complete all work promptly.

Harry Linton, formerly superintendent of the Central Foundry & Machine Company, of Wheeling, W. Va., on Jan. 1, entered to his new duties at superintendent and general manager of the Kewanee Foundry & Manufacturing Company, Kewanee, Ill.

DEATHS

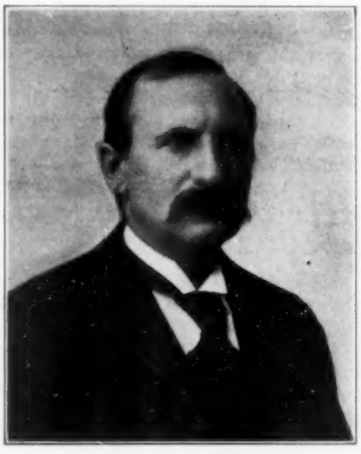
J. F. ELLIS

John Francis Ellis died at his home on Migeon avenue, Torrington, Conn., on Christmas Day at the age of 58 years. Mr. Ellis had been suffering for the past five months, and the ultimate cause of his death was angina pectoris. His condition having been critical for the past week his death was not entirely unexpected. John F. Ellis began his industrial life at the age of 18 years, when he entered the employ of the Harris-Corliss Engine Company, Providence, R. I., and learned the trade of machinist. Remaining at this place for thirteen years he then went to the B. F. Goodrich Rubber Company, Akron, Ohio, as superintendent of the hard rubber shop. Leaving Ohio in 1884 he came to Torrington and took up the position of master mechanic for the Coe Brass Company. He occupied this position until the American Brass Company was organized, when he became consulting engineer of the new company, which position he occupied at the time of his death. He is survived by a wife and two daughters of Torrington, Conn., and a son, Henry G., of Pittsburg, Pa., and a brother, William, of Canton, Ohio. Mr. Ellis was a member of several scientific societies.

J. F. ELLIS.

EDWARD BALBACH JR.

Edward Balbach, Jr., president of the Balbach Smelting and Refining Company, Newark, N. J., died in New York, Friday, Dec. 30, at the Savoy Hotel. Mr. Balbach was born in Carlsruhe, Baden, Germany, seventy-two years ago, coming to this country with his family in 1848. The smelting business of which he was the head was established by his father in 1851. He became connected with the business shortly after its establishment, and became president at the death of his father, which occurred a few years ago. The Balbach Smelting and Refining Company is the largest of its kind in the world, occupying more than four acres of ground and employing five hundred men. Mr. Balbach was active in the business up to the time of his death. He is survived by his wife, Mrs. Julia Balbach, and a daughter, the wife of Edward Randolph, who is secretary and treasurer of the smelting company.



EDWARD BALBACH, JR.

As we go to press we learn of the death in Philadelphia, Pa., of Benjamin Cramp, for many years superintendent of the brass foundry at Cramp's shipyards.

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS IN THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

WATERBURY, CONN.

JAN. 9, 1911.

Waterbury's metal factories have entered on the work of the new year with a slower stride than was noticeable a year ago, but with no semblance of gloomy prospects. Throughout the entire Naugatuck Valley, in the brass and copper factories there is no great hustle, nor any remarkable influx of orders, but there is nothing but a spirit of good times to be found, although there are no extra hands at work in any plant. It is the opinion here, and clearly demonstrated by conditions, that conservative, steady growth is to be expected rather than any swift current of prosperity, and there are few who do not believe that the approach of February will find things looking upward with the prospects of a busier season as spring draws on. So far as they can be ascertained here, the reports of salesmen on the road are that there is no great amount of stock on hand anywhere, and with ordinary business there should be plenty to keep the factories running at average speed.

There was a day or two more allowed for the holiday vacation this year in most of the factories here. The shutdown in the largest number of instances extended from Dec. 25 to Jan. 2, but in some instances work was not resumed by the entire force of hands until Jan. 3, and then the men were made busy on the taking of inventory in various departments. In a few of the smaller plants Dec. 26 was the only idle day. In Scovill's, the Chase Rolling Mills Company's, Farrel Foundry and Machine Company's, Waterbury Manufacturing Company's, Waterbury Clock Company's, Steele & Johnson Manufacturing Company's, Ring Company's, the New England Watch Company's, and the plants of the American Brass Company (the Waterbury Brass Company and the Benedict & Burnham Manufacturing Company) work was resumed with the average forces of help and no great rush of business, but all are running on regular time, and that fact alone is ample evidence that the manufacturers consider the outlook safe and promising. For the extra hands who are out of employment, mostly unskilled hands, there is plenty of work, and this town can claim nothing of the nature of hard times.

Waterbury and the Naugatuck Valley industries have had a fairly good year. It opened dubiously, but in a short time there was evidence of a general and generous boom, and for the first six months all lines experienced a revival that inspired new hope and brought with it ample evidence of the return of prosperity to all parts of the country. With the approach of summer, heavy orders began to drop off. Then the coming on of fall brought a revival of small dimensions but sufficient in several plants to make it necessary to hire extra hands, and the general hum of busy, good times was evident throughout this valley. This continued clear up to Dec. 1, with but a slight tapering off, although orders had ceased coming in rapidly as early as October. December was but an ordinary month, and in some nearby towns some shops closed down.

It was a good year in the clock and watch lines, and saw some heavy contracts filled in the line of casting and heavy machinery by such firms as the Randolph-Clowes Company and the Waterbury Farrel Foundry and Machine Company. It saw also the filing of a big contract for the government by the Benedict & Burnham Manufacturing Company (American Brass) in its tube mill, and in the various lines of the Scovill Manufacturing Company there was little evidence of poor times, heavy and light goods being produced in generous quantities. The same may be said of the Waterbury Manufacturing Company and the Chase Rolling Mills Company. Clocks and watches both were produced by the Waterbury Clock Company at about the same speed in all seasons, the foreign sales of the popular-priced timepieces produced here having far exceeded expectations in many localities with the result that there was little slackening in their production. The Blake & Johnson Manufacturing Company made rapid strides forward during the year.

As usual, conservation marked improvements, but there was no lack of progress in the local plants, considered as a whole. Building was carried on pretty extensively in the early part of the year and hundreds of thousands of square feet added to some plants, the contracts having been planned and let out one or two years previously. At the Scovill plant especially there was a notable stride forward in the acquisition of buildings and the improvement of the grounds, while all the large plants were able to find spare time to make improvements where needed.

One of the most surprising announcements of the year was that of the Baird Machine Company to the effect that it would remove its plant to Bridgeport. This was followed soon after by the announcement of the Waterbury Crucible Company's plans to liquidate and go to Detroit, where it will make a new start. These two announcements together caused considerable of a stir. In the case of both the concerns mentioned removal was not due to lack of capital or lack of quality in products, so far as can be learned, but probably to incompatibility or the desire to get nearer a more advantageous shipping point or a center more favorable to rapid development of a special line.

Neither of these sites has yet been taken, but there have been several rumors as to the installation of a new shop in the Baird plant as soon as it is vacated, the most persistent of which says that the new industry will be akin to the corset and millinery business, producing cloth-covered wire goods. No authentic information on the subject has yet leaked out.

One of the notable events of the year was the round-up of copper thieves in the Scovill Manufacturing Company's plant, with the result of some arrests also when goods stolen from other plants were found among those seized from junkmen indicted for complicity in the Scovill thefts. These cases, some forty odd, have practically been cleaned up by the authorities, most of the culprits being sentenced to jail and to pay heavy fines. In the case of one of the junk men what is thought to be a death blow at crooked junk business was dealt when the Supreme Court of Errors decided the case against Alderman. This appeal of the defendant was based on the fact that, having bought the goods from another party than the thief, he was not the receiver of stolen goods. This point was never tried out before in New England, and when it was decided in favor of the State the rest of the dealers whose cases were pending promptly pleaded guilty. Most of them, in addition to heavy fines, were sent to jail.

W. B. F.

PROVIDENCE, R. I.

JAN. 9, 1911.

The year 1910 has been written into the industrial history of this community and will be read as among the most successful and important, and in many particulars the most interesting of any since the birth of the new century. In every branch of the metal business there has been a steady increase, with additional concerns and the expansion of several of those already established. This has been especially true of the manufacturing jewelry industry and its kindred and dependent branches. The volume of trade in all lines has been much in excess of many years during the past decade; collections have been easier and there have been few failures and none of appreciable magnitude.

Providence (and when Providence is spoken of industrially, it applies to the entire State of Rhode Island) has been especially

fortunate during 1910, inasmuch as there has not been any strikes or labor troubles of any character. One incipient misunderstanding among a few Italian pressmen in one of the shops producing jewelers' findings early in the year caused a slight ripple but, lasting but a few hours, was soon forgotten. As a whole, especially as pertains to the jewelry business, the year has been marked by a more uniformity of time schedule than ever before known. The labor leaders point to this as being due to the new law governing the restriction of the hours of employment of women and children, but the manufacturers claim that it has been due to a more generally distributed purchasing tendency on the part of the wholesalers and jobbers than ever before.

During the year the large factory of A. T. Wall & Co., platers, on Clifford and Claverick streets, has been finished and is being occupied by firms allied to the jewelry industry. The Metals Product Corporation has begun an extensive addition to its plant at Thurbers avenue and Eddy street and the walls of the five-story factory block at Chestnut and Pine streets for the Waite-Thresher Company are beginning to rise from substantial foundations, and by early summer will be ready for their occupants.

The committee recently appointed by the Board of Trade of Attleboro to arrange for a jewelry exhibit in connection with the 1911 exhibition of the Boston Chamber of Commerce has begun plans for the event. Attleboro and North Attleboro manufacturers will be asked to club together to make the exhibit representative of the Attleboros' and the jewelry industry. It will be carried out on a large scale.

The employees of the Manchester-Smith Company, silversmiths, at 185 Eddy street, Providence, R. I., presented their foreman, Charles W. Hempel, a handsome gold diamond-studded Knights Templar watch charm at Christmas.

NEWARK, N. J.

JAN. 9, 1911.

The manufacturing jewelers generally report a very fair business for the year of 1910 as a whole, and while there are always some who will complain, the greater portion have made money. The year could have been better and worse. The demand for 10-karat goods has been strong for the past twelve months, the 14-karat and better lines have shown some improvement, silver and metal novelties have had an exceedingly good year, material men, tool, machinery, die makers, etc., have had a good year; the demand for gems, precious and semi-precious stones and pearls has shown a slight increase in demand. All gems are popular, but the pocketbook is not as full as it might be and the buying power of the public has been curtailed somewhat. The past year has been a strong one for platinum and probably in no other year has its uses been so many and varied and its popularity more general. The manufacturing jeweler likes it the way it works up, the retailer recognizes its superiority and the public knows a good thing.

The salesmen have mostly been called in now and are taking a well-earned rest. The various plants will during the next few weeks, which is the dull season, be overhauled, improvements, repairs and enlargements made. There is the usual talk of new buildings, new firms and various changes contemplated.

This city being the centre as a manufacturing and distributing point for metal novelties, the trade is always growing and new things coming out. There has been a big increase in these lines here and there will be some changes and enlargements this coming year.

A bad fire recently put Lebkeucher & Co., on Prospect street, out of business at their own plant. Their work is being carried on just the same, however, orders being filled from the plant of Krementz & Co., Mulberry and Chestnut streets. Work will be resumed at the old quarters as soon as it can be put in proper condition. This firm makes silver novelties.

The firm of Smith & Anderson, manufacturing jewelers, 12 Green street, have dissolved partnership, the business being continued by George W. Anderson, W. P. Smith retiring.

H. D. Gardner has opened a shop at 60 Arlington street, to do silver, gold and brass spinning. He has also headed the new concern, the Newark Art Mechanical Metal Works, at the same address. One of the specialties they will make is an egg tester that will show whether an egg is good or bad. Schonbacher & Co., who started in business last summer, but have only recently gotten out their line, have been very busy making 10 to 14-karat goods. They have been working on full time and the salesmen are turning in good orders.

John J. Jackson, of 71 Mechanic street, is a large manufacturer of rolled sterling silver, the heavy goods being in strong demand for hollow ware and the light thin stock for novelties not in as strong demand. He says the past year's trade has been a good one and ahead of the previous year.

The K. Bracher, Jr., Manufacturing Company, of 101 Mechanic street, who do a large business in supplying the trade with oil stones, were burned out, with a loss of $5,000. They have quarries and get their stone from Hot Springs, Ark. They have also contemplated the cutting of diamonds and other stones, but have not got to that branch of the business yet.

Thurstons & Waters, who started in not long ago making catch pins in the Richardson building, have taken larger factory space on the sixth floor and are now making, in addition, a general line of jewelry novelties. L. Fritsche & Co. have had a larger business since moving from Hamilton street to the Harpers building, at Washington and Crawford streets. They make a line of 10 and 14-karat gold goods and have had very good success.

With trains running direct from the Pennsylvania station in New York City to Newark, the facilities have already been of great benefit and much time is saved by commuters and others doing business between the two places. The jewelry, silver and metal working trades are probably in a position to see the advantage more than any other lines. Many years ago all the selling of the jewelry products made here was carried on in this city. Later years the manufacturers saw the necessity of having New York offices for the sale of their goods, as it was a great distributing point for such lines. During the last year or two many of these New York offices have been closed and the selling is now done direct from this city, more buyers coming here than ever before as they can see the factories in operation and a most varied line of goods. This applies both to those selling to the retail and jobbing lines. A great many of the firms here now have no New York representative at all.

Frank Gerlock, who for years made pearl buttons and novelties at 73 Hamilton street, has increased his business considerably since moving to 88 McWhorter street. He has taken up the line of link and cuff buttons and will probably make cheap plated jewelry.

John Hunkele, who used to be with Day, Clark & Co., started in manufacturing jewelry and repair work, in a small way, at 284 Springfield avenue. He makes 14-karat lines. The Leo D. Greenfield Company, making patent buckles of brass, bronze, etc., at 62 Railroad avenue, will move, as the Pennsylvania Railroad Company has bought the property at that location. They will also take up some gold and silver lines of manufacture. V. F. Hatch has been covering this territory for the Seymour Manufacturing Company, of Seymour, Conn., manufacturers of German silver, bronze, brass, copper, nickel anodes, etc.

The Aronson Company, 5 Mulberry street, a new concern related to the Art Metal Company, have had remarkable success with a perpetual calendar, of bronze casting, showing the days, weeks, months and years, all controlled by a cord. S. Saiken has started making rings and diamond settings in a small way at 210 Broome street. The Rustic Initial Company, Henry Rupp, manager, 71 Springfield avenue, are making a specialty of sterling silver letters and monograms.

F. J. Huebner is now the sole proprietor of the F. J. Huebner Novelty Company, who moved from Market street to 43 Lawrence street. L. A. Meyers, Jr., Inc., 139 Ogden street, making belt buckles of brass, bronze, silver, etc., has had a busy year and is well satisfied.

Fred Marx, 346 Mulberry street, who has a business of repairing jewelers' tools, got up a new invention with a suction force, to remove particles of gold, silver, dust, etc., saving the scraps and sweeps. H. S.

BUFFALO, NEW YORK.

JAN. 9, 1911.

That Buffalo has forged ahead as a center of the jewelry manufacturing interests was proven by the recent organization of the new 14-Karat Club, which held its first banquet and election of officers on Jan. 2, at the Lafayette Hotel. The club is composed of men who sell Buffalo-made jewelry on the road, and thirty members were present at the first meeting. It is estimated that Buffalo sends out about $3,000,000 of manufactured jewelry every year, and is now classed among the jewelry centers of the country, with Attleboro, Mass.; Providence, R. I., and Newark, N. J. Over half of the jewelry salesmen in the city are members of this new club.

Its purpose is to promote good fellowship among local salesmen and to advertise Buffalo as the big center of jewelry industry. The president is Solomon J. Levy. The evening's address was given by Mayor Furhmann's secretary, John J. Sayles. Mr. Sayles went over Buffalo's many advantages as a manufacturing center and prophesied its future to be one of the most successful as the center of the jewelry industry.

All the members have pledged themselves to advertise Buffalo-made goods along jewelry and its kindred lines in their work on the road.

Buffalo manufacturers are interested in the purpose of the new Industrial Bureau which has recently been established in connection with the work of the Chamber of Commerce. It will help to build up existing industries and secure new ones. The bureau states officially that it will assist in getting industrial switches from the railroads, in securing sewer and water privileges, in getting transportation facilities, in directing the attention of the public to the fact that Buffalo manufactures certain kinds of products which her citizens should buy here, in interesting investors in meritorious enterprises, in establishing a business where one is demanded and none exists, in collecting and furnishing data to substantiate the city's claim for preference, and in bringing new concerns to Buffalo.

All the lines of metal industry throughout the city report a good business, and the New Year opens brightly in Buffalo for sheet metal workers, brass industries and foundry companies. With the addition of fifty new rooms, each to include a modern equipped bathroom at the Iroquois Hotel, there will be a demand for plumbing finishings. The work of building the addition will begin this spring. Frank B. Baird, president of the Buffalo Union Furnace Company; Harry Yates, vice-president and treasurer of the Buffalo Union Furnace Company, are new stockholders in the Commonwealth Trust Company, of Buffalo. A large portion of the stock of the trust company was held by Eastern interests who, by reason of their non-residence, were unable to give to the institution much assistance, and, believing that resident stockholders would be of greater benefit, the stock was purchased locally, and the largest stockholders are: President Baird, Treasurer Yates, of the Buffalo Union Furnace Company, and William H. Crosby. A new company has recently been incorporated under the name of the Ajax Hardware Manufacturing Company. Its capital stock is $10,000 and its directors are: Adolf Rosenberg, Frank W. Pardel, Ellsworth E. Clark and Thomas S. Hemenway.

Industrial conditions at Niagara Falls during the last month of 1910 showed a tremendous increase. In a report recently submitted by Representative James S. Simmons, he stated that the Hydraulic Power Company has added 20,000 electric horsepower to its output by the installation of two additional units. The new industrial settlement at the north end will be supplied by a conduit from the Hydraulic Power Company with 40,000 horsepower. The Electrode Company is building a plant in Buffalo and all the established factories report increases in business with additional operative forces of from 25 to 250 men.

Charles M. Hall, vice-president and manager of the Aluminum Company, of America, is the second Niagara Falls man to receive the Perkin medal, given yearly in recognition of prominent work done in chemical lines. Dr. Hall's work with aluminum and the development of the use of the metal in the arts won for him this distinction. The award was made by a committee of twenty men prominent in chemical societies all over the country. On Jan. 21 the presentation will be made at the Chemists' Club in New York. Dr. Edward G. Acheson, of Niagara Falls, was awarded the medal for skill in the same line last year.

The plant of the Lockport Stamping Company was seriously damaged by fire Christmas week. The fire started in the japanning room and did about $300 worth of damage. The Lockport Light, Heat and Power Company occupy the first floor of the same building, and during the progress of the fire it had to be shut down so that while the firemen fought the flames in the Stamping works, every concern in the city was out of commission.

McG.

CLEVELAND, OHIO

JAN. 9, 1911.

Manufacturers allied with the metal trades in this territory are well pleased with the showing made by the year of 1910 and with the outlook for the coming year. When inventories are all taken it is firmly believed that the past year will show a new record, despite the fact that the automobile industry has been in a somewhat unsettled state. Cleveland has about a dozen auto factories and is credited with being the second largest producing point in this country. All of the institutions, with one or two exceptions, weathered the storm in good shape and did not come near having any trouble. Conservatively managed, they have all been put in good shape, and with a strong demand apparent for the coming summer, there promises to be a general revival of the business.

The aluminum business in Cleveland for 1910 was extraordinarily heavy. With a great deal of stock being turned out for the auto industry and for kindred things, the amount of metal castings from the aluminum foundries has been unusually heavy, according to those in charge of the big plants here. Considerable work has been done in turning out aluminum castings for aeroplanes, several big aviators securing their work in this city. The increase in the use of aluminum ware of all kind has been heavy and promises to keep in favor during the coming year.

The plumbing goods makers have had a banner year. Just as the building records of the country have broken all bounds, so has the demand for plumbing goods, faucets and metal fixtures of all kinds gone beyond all former limits. Several important plants here have greatly increased their facilities. An allied industry has been the manufacture of soda fountain apparatus. The Bishop & Babcock Company have added several large sections to their plant and are contemplating others. The Wise Soda Apparatus Company has just completed the erection of a large new plant at Bellevue, O., with 50,000 square feet of room and eight acres of adjoining ground on which to expand as needed. The company makes a specialty of making all kinds of confectionery and drug store fixtures.

At the annual banquet of the Sheet Metal Contractors' Association, held during the past month, George P. Early, of Pittsburg, gave the chief address. Guests who were present from Pittsburg were: D. M. Buck, J. F. Beck, W. C. Carroll and M. S. Dennis. The following officers were elected: President, H. B. McGrath; vice-president, F. C. Thornton; secretary, Chester M. Harris; treasurer, A. H. Rudolph; directors, F. C. Thornton, chairman; H. B. McGrath, ex officio; A. E. Riester, Frank Hiller, Robert Kain, F. M. Potter, H. H. Lind and F. P. Frantz.

During the past month the Gabriel Horn Company, a concern manufacturing an auto horn, consisting of a series of brass tubes on which tunes could be played, was destroyed by fire with a loss of $50,000. The factory of the J. A. Cochrane Hardware & Brass Company, adjoining it, was saved by heroic efforts on the part of the firemen. The Gabriel loss was covered by insurance.

Manufacturers of metal goods in Cleveland are giving their indorsement to the One Cent Letter Postage Association, an organization recently launched in Cleveland, with George T. McIntosh, former head of the great Hardware Corporation of Cleveland, as secretary, and C. W. Burrows as president. The organization has for its aim the cutting of the letter postage rate from two to one cent. All manufacturers have heavy postage accounts. If one-cent postage was secured it would mean that these accounts would be cut in two. For this reason manufacturers generally are giving the movement their support and are sending for membership cards to Mr. McIntosh, at his office, 506 Chamber of Commerce building, Cleveland.

George B. Post & Sons have been chosen as architects for the new $2,500,000 hotel, to be erected on Euclid avenue, this city, during the coming year. A large quantity of bronze work will be used. E. M. Statler, of Buffalo, is promoting the project.

Williams & Co., of New York, were the lowest bidders for the bronze doors for the new county courthouse. There are ten pair of exterior doors and ten vestibule doors. Their bid was $56,000. The estimate of the architect, Charles F. Schweinfurth, was that the doors would cost over $74,000. The Tyler Company, of Cleveland, was another bidder.

The Sargent Company, of New York, has almost completed the installation of many tons of beautiful bronze work in the new federal building, just being completed on the Public Square, this city, at a cost of about $3,000,000. It is said to be the finest postoffice building of its size ever erected anywhere.

S. L. McM.

DETROIT, MICH.

JAN. 9, 1911.

Detroit had a very satisfactory year during 1910 in spite of the recession which marks many lines of business throughout the country in general. The year presented many interesting business conditions, but none more interesting than the fact that many new records were made in earnings. Dozens of new factories were erected in Detroit during the year. Many of these were brass, aluminum and automobile establishments.

The brass and aluminum business has continued at a high-water mark throughout the greater part of the year. This applies particularly to the automobile industry. In other lines the business has not been as good as it might have been. Taking the industry in a general way, however, there is very little complaint made. The closing weeks of the year, however, in all lines of brass and aluminum have been quiet. This is accounted for by the fact that the automobile industry is dormant and will remain in that condition probably until about the middle of January, when the spring campaign will be resumed.

The manufacture of plumbers' supplies during the past year has been about the same as a year ago. Apparently there has been no particular advancement, and at the same time there has been no particular slump. Manufacturers in this line believe the spring trade will soon improve the business, and the output for the month of January will not be below the average. Owing to the lethargy in the automobile industry the manufacture of brass and aluminum parts has been exceedingly quiet for the past four weeks. The factories, however, are all running on regular time, but the number of employees have been considerably reduced.

All eyes just at present are directed toward the coming automobile show. This annual event opens in Detroit on Jan. 16 and will continue for one week. As soon as this event closes the automobile business in Detroit will witness a decided improvement. Manufacturers are holding off until after this exhibition, which attracts buyers into Detroit from all parts of the country.

The jewelry business in Detroit has been unusually good during the past month and throughout the latter part of the year for that matter. Manufacturers have placed many novelties on the market that were readily received by the purchasing public. Detroit manufacturing jewelers are building up a good trade in the East. Their products in years previous have been sold principally in the West, but during the past year a strenuous campaign has been waged in the East where the Western goods now are in good demand. The Christmas trade has been unusually good and all manufacturers are planning for a still greater campaign during the present year.

F. J. H.

CHICAGO, ILL.

JAN. 9, 1911.

Though officials of the Western Electric Company refused to be quoted on the subject, they freely admitted in private conversation, that if no defect be found, the recent discovery by a United States signal service officer of a method of simultaneous use of the same telephone circuit by several persons may be far reaching in its effect upon the telephone industry. The saving of copper alone in the manufacture of telephones would amount to several millions of pounds yearly, to say nothing of the reduced use of zinc which would naturally cause some reduction in the market price of those metals and thus cause a reduction in the cost of production each 'phone of the smaller number turned out.

Sales managers of the Elgin Watch Company and also of the Rockford Watch Company, as well as the sales forces of the other watch manufacturers in the Chicago district, are practically agreed that the past year was one of the best in the trade and they have unusual facilities for ascertaining since about 58 per cent. of all the watches made in this country are turned out in the factories about Chicago. All told, the watch trade of Chicago last year was over $11,000,000, of which about 65 per cent. were of the open-faced sort and of the balance a considerable portion were encased in metal of the finer grades in the class called precious. Though the inroads of the Eastern dollar watch were noticeable, they are said to have been kept well in subjection by the Western trade and the demand for watches of better material was successfully stimulated from the first to the close of the year. Neither did importations very materially affect the market, as the principal foreign competition was merely in a limited supply of Swiss movements fitted to American-made cases. But these watches are mostly very small and are bought chiefly by or for children, who may be relied upon to soon demolish them. Throughout the entire year the Elgin people say that they continued a daily output of 3,000 watches, including all of the several grades they make, and their purchases of metal supplies for the current year provides upon an expectant and optimistic basis for a liberal increase.

There are few things wrought from the metals which are not made or installed by the Allis-Chalmers Company at their various plants and salesrooms here and in Milwaukee, and although their business has always been essentially large, they have lately not been making money in the large way it was thought the company should make it, and therefore the directors have lately disagreed with President W. H. Whiteside and enlisted the interest of the J. P. Morgan Company, who have replaced Mr. Whiteside with D. W. Call as president and a progressive and prosperous year is now predicted.

Western manufacturers of silverware say that although the output of silver bullion has been increasing every year for a long time, yet the cost of skilled labor in the trade has lately advanced so constantly that the finished product cannot now be turned out at a cost any less than when the visible supply of metal was much smaller and the market price of it much lower. Indirectly many other advanced costs contribute to swell the selling price of silver plate notwithstanding the far larger output of the industry that general prosperity makes necessary. Aside from the growing greater demand for such wares and the consequent increased competition in artistic finish tending to sustain prices in the market, a sales manager, who declined to be quoted, suggested as a further explanation of the strong market, the increased general cost of doing business and the apparent desire of many new purchasers of such wares to have them made as expensively as possible and in support of this view he cited the recent purchase by former Senator W. A. Clark, of Montana, of a silver dinner service from the Spauldings in this city costing $100,000 to make, and he also recalled quite a list of others from the records of the year in the precious metal industries of Chicago.

Though the Spauldings seem to be somewhat expanding their fine silver ware output, the Peacocks seem to be confining their manufactures to a few lines of high-grade gold ornaments, and the W. K. Cowan Company are expanding their various lines to cover almost every grade and class of plate and other products from the precious metals and alloys.

Illinois charter privileges have been granted to Silas H. Bringham, John Sherwin and Millard S. Fegan to organize a corporation under the name of the Bringham Brass Manufacturing Company, with a capitalization of $50,000, for the purpose of manufacturing brass and brass products in Chicago, where the business is to be soon put into operation.

BRITISH METAL TRADES. ANNUAL REVIEW OF 1910, FORECAST FOR 1911

BIRMINGHAM, ENGLAND, JANUARY 2, 1911.

BY JAMES HORTON.

After the doleful stories which for the most part have constituted British metal trade reviews in recent years, it is pleasant to strike a more cheerful note with regard to the year just ended. The non-ferrous metal trades which claim Birmingham as their most important British center, record a year of considerable prosperity and great activity, a gratifying feature being that the close of the year finds business still on the up-grade, with excellent prospects for 1911. In the brass trade, the year has been in many ways most eventful, especially in regard to the relations between capital and labor. In the volume of business a decided lead has been taken by the department devoted to the manufacture of steam and water fittings. This branch has benefited most by intelligent organization. The year commenced with an amalgamation, dating from Feb. 1, of four large firms, namely, Gaukroger, Sykes & Roberts, Ltd., Halifax; Newman, Hender & Co., Woodchester; I. Storey & Sons, Ltd., Manchester, and Martineau Beames & Madeley, Ltd., Birmingham. The object was to reduce working costs, and enable different firms interested to specialize on the various branches of trade, and to improve works organization generally, so as to meet foreign competition, any ulterior motive of price-raising being expressly repudiated. The combination has met with great success, has been further extended, and at the present time is increasing plant with the object of meeting further demands. The same story of activity is told by all manufacturers in this department.

The cabinet brass department is not quite so promising, partly because in this branch there is no sort of agreement as to prices, and every maker is a law unto himself; but the advances in wages have to some extent forced up prices, so that selling figures are more reasonable than they were. The reports of manufacturers are greatly confirmed by the trade union returns as to unemployment. The workmen state that employment has been fairly abundant all the year. In fact, 1910 has been the best year for whole decades—one authority puts the period of comparison at thirty years—with scarcely any out of work. In fact, the number of unemployed is less than a third that of last year, although the membership in the meantime has greatly increased. From the labor point of view, an excellent year is anticipated in 1911.

A word should be said about the ornamental brass business, which caters for high-class leviathan steamers. Probably the Birmingham firms devoted to this work have never had a better year. Prominent firms are at present engaged on the decoration for the "Olympic" and "Titanic," White Star giants, a contract which shows that the reputation which brought them so large a share of the metal equipment of the "Lusitania" and "Mauretania" has by no means declined. These orders have brought many thousands of pounds into Birmingham.

In those branches of the metal trade devoted to metal rolling, wire drawing and brass and copper tube making, the year has been exceptionally active. Very large outputs have been made, and an important feature of the mechanical equipment has been the wide and rapid adoption of electric driving by a number of the largest mills in Birmingham. The city is especially well equipped for the supply of electricity, and sells it at a cheap rate. It has been found possible to take out steam boilers, and so greatly economise shop room as well as labor. The system is popular, and although the users are reticent as to results, the retention and extension of the system is the best evidence of its success.

Financially, an equally good story cannot be told. In the first three months of the year the local papers were loaded with complaints from companies and shareholders who, while full of work, were unable to make profits. Prices are described as ruinously low, and there has been much talk of efforts at combination. Such efforts, however, have never gone beyond the most tentative preliminaries, and the general belief is that, with the present feeling of mutual hostility, no hope of such combination is possible. In this trade it has been a workmen's year, because the men have been fully employed, and the British makers have not only retained their own trade against foreign competition, but claim to have increased their hold upon neutral markets.

Technically, considerable progress has been made, and one of the latest achievements of the year was the establishment in Birmingham at the end of November of a branch of the Institute of Metals, the first local center established in Great Britain, with a satisfactory membership. It is to be carried on partly on social and partly on technical lines, and in February a paper is to be given on "Rolling Tube Mill Practice in America," and in March on "Annealing and Annealing Furnaces." It is recognized that technical progress is going forward at a greater rate in Great Britain, and especially in Birmingham, than ever before. The Institute of Metals is making rapid and solid progress in all the great metal-working centres.

There has been some elation in Birmingham over the discovery of a new alloy of aluminum, by Messrs. Vickers, Son & Maxim, the great shipbuilders and metal workers, which is expected to form the basis of a new department of Birmingham metal manufacturing, and which, it is hoped, will have a great vogue for motor cars, aeroplanes and dirigibles, owing to its high tensile strength and lightness. The alloy has been named "Duralumin." It contains 90% of aluminium, its specific gravity varies between 2.77 and 2.84, yet its tensile strength, elongation and contraction is as good as mild steel, and it can be made suitable for forging, rolling or drawing, with varying hardness. Test pieces have stood a tensile stress of 26.9 tons per square inch, and 22% elongation on two inches. The metal will take a high polish, equal to nickel plating, withstands atmospheric influence, is but little affected by sea or fresh water, is not affected by mercury, and is non-magnetic. Almost anything can be done with it, although it is not recommended for castings. Birmingham metallurgists consider the discovery a great triumph and anticipate for it a wide field of usefulness.

As usual, the trade in precious metals has been the last to experience the effect of the general trade recovery. Business was really bad for the first three months of the year, and there was considerable unemployment with short time. About midsummer there was a marked improvement, and this has since further developed, so that trade experienced an excellent Christmas boom. The Assay Returns issued in July showed a general increase, but with important exceptions. Silver wares assayed totalled 3,992,647 ounces, as compared with 3,661,389 ounces. The gold wares assayed and marked represented a decrease, being 296,977 ounces, compared with 339,391 ounces in the previous year.

The year has not been notable for alterations or amendments in assay rules, but an important change has been the adoption of the practice of marking everything in detail. Practically every constituent part of such articles as bracelets and ornamental padlocks has now to be marked, in addition to the marking of the article as a whole. The close of the year finds manufacturers in practically all departments very full of orders. Very large additions to staff have been made, especially in the silver and electro-plate departments. There appears to have been a transference of electro-plate business from Sheffield to Birmingham, one estimate putting the number at 100 platers for every one employed in Birmingham ten years ago. A remarkable instance of activity relates to a firm employing 220 hands, who are working nightly from ten to eleven o'clock. The popularity of silver knick-knacks for toilet ware, which has been a feature of the trade for the past few years, continues, but there is a marked preference for solid material, the public taste for "shadow" jewelry and silverware having gone off completely. Generally speaking, there is less cheap jewelry worn, and even comparatively poor people insist on having fairly good stuff, that looks and wears well.

A remarkable feature of the trade has been the demand for novelties, dealers showing no appetite for ordinary ware, whereas they can always be attracted by novelties. The export trade appears to be increasing, with most foreign countries, and the Colonies, with a fine business for Canada and Australia. In gold goods there is much more marked preference than formerly for gold of 15-carat and upwards. In gem jewelry there has been a run on fancy stones, such as tourmalines, peridots and amethysts. There is a preference for whole-pearl as compared with half-pearl ornaments. The improvement in quality is manifest from the predominence of really good jewelry in the London shops. The efforts of the assay authorities and the trade combined during the last few years have had the desired effect of ridding the trade of a great deal of shoddy ware and generally improving quality.

TRADE NEWS

TRADE NEWS OF INTEREST DESIRED FROM ALL OF OUR READERS. ADDRESS THE METAL INDUSTRY, 99 JOHN STREET, NEW YORK

ADDITIONAL TRADE NEWS WILL BE FOUND UNDER "CORRESPONDENCE."

Plans for the new building which the Buckeye Aluminum Company, will erect at Wooster, Ohio, are now under way, and it is expected that construction will begin shortly.

John Hassall, Inc., Clay and Oakland streets, Brooklyn, N. Y., announces that for the convenience of their local trade, they have established a New York salesroom at 45 Lafayette street.

The Eastern Metal & Refining Company, Charlestown, Mass., report that they shall probably not rebuild the buildings which were burned on Dec. 8, involving a loss of $4,000, until spring.

The Brown & Sharpe Manufacturing Company, of Providence, R. I., have placed upon the market a new plain milling machine, known as No. 2 B No. 13, the capacity of which is 34 by 6 by 12 inches.

The announcement is made of the consolidation of two trade journals, Cement Age, of New York, and Concrete Engineering, of Cleveland, Ohio, with offices at 30 Church street, New York.

The published report that the Aluminum Company of America is arranging to make extensions, additions and improvements to its plant at Massena, N. Y., is said to be false by G. R. Gibbons, secretary of the company, who says that no such extensions are being made.

The new works of the Superior Bronze Company, Pittsburg, Pa., manufacturers of bronze and brass castings, babbitts and white metals, are 40 by 100 feet, contain three large and two small furnaces and have a capacity of three tons per day of castings.

W. E. Mowrey, 414 Robert street, St. Paul, Minn., is about to erect a refinery for the purpose of treating jewelers floor sweeps and refuse containing gold, silver and platinum, and would like to correspond with manufacturers of furnaces and equipment suitable for this work.

The Eleventh International Automobile Show was held in New York December 31 to January 11. In addition to the usual line of brass lamps and metal parts of automobiles there were on exhibition several metal aeroplanes with parts constructed of aluminum alloys.

At the annual meeting of the directors of the Eureka Foundry Company, Cincinnati, Ohio, the following officers were elected: William H. Merten, president; Oscar Reimert, vice-president and treasurer; Emmett H. Daugherty, secretary. It was announced that the company would be reorganized and rehabilitated.

The Pacific Plating Co., 145 West Railroad street, Los Angeles, Cal., which is engaged in manufacturing builders' hardware, has just closed a successful year of business, and will at once begin upon an extension to their plant. It will increase its capitalization to $100,000, and select a name more suitable for a manufacturing concern.

The Suspension Roller Bearing Company, Sandusky, Ohio, has been incorporated with a capital stock of $250,000, and will erect a one-story building of 60 by 350 feet, part of which will be used as a brass foundry. The construction and equipment of the plant will be in charge of the Osborn Engineering Company, of Cleveland, Ohio.

The Hoyt Electrical Instrument Works, Penacook, N. H., announce that it has been found advisable to close the sales office which they have maintained at 161 Summer street, Boston, Mass. The communications of customers will receive careful attention if sent either to their New York office, 136 Liberty street, or to the factory at Penacook, N. H.

The Manufacturers' Library has been established by the Commercial Bureau Company, Hudson Terminal Buildings, 50 Church street, New York. The company has established a library, reading rooms, headquarters for manufacturers and out-of-town visitors where they may obtain information about the commercial markets of the world.

Smith, Emery & Co., Inc., engineers and chemists, San Francisco, Cal., who were burned out in the big fire, announce the completion of a reorganization of their business, made necessary by its rapid growth and development. The capital stock has been increased to $100,000, and the latest bookkeeping and filing systems are being installed.

It is reported that The International Nickel Company has purchased 110 acres of land at Roosevelt, N. J., where an extensive plant will be erected for use by the Orford Copper Company, one of the subsidiary companies of the International Nickel Company. This plant will probably be devoted to the manufacture of monel metal in sheets and castings.

The Sherwood Metal Working Company, manufacturers of metal window screens, Syracuse, N. Y., recently held their election of officers. These officers and directors are:—Edwin B. Chapman, president; H. L. Yearkle, vice-president; W. D. Biggers, secretary and treasurer; William E. Sherwood, general superintendent; Edward Kemp, Frank O. Briggs and F. M. Bentley, directors.

The following officers were elected at the annual meeting of the stockholders of the Neenah Brass Works, Neenah, Wis., held on Dec. 18: William C. Nash, president; David Horkman, vice-president; H. Horkman, secretary, treasurer and manager. It was unanimously decided to make a present of one share of stock to faithful employees who have been in the service of the company for five years or more.

A new plant is being erected at Groton, near New London, Conn., by the Vanadium Metals Company, of Pittsburg, Pa., in addition to their East Brainstree foundry. The buildings, which will be of steel, brick and concrete, and cover an area of 50,000 square feet, are expected to be finished and ready for occupancy March 1. Both plants will be under the management of Victor C. Lassen, superintendent of the company.

A comprehensive display of motor trucks, delivery wagons and self-propelled road machines for all sorts of industrial purposes is to be held in Chicago during the week of Feb. 6 to 11. It will follow immediately after the annual automobile show, which is held from Jan. 28 to Feb. 11, and will occupy the same building and be conducted by the same management, under the auspices of the National Association of Automobile Manufacturers.

Among the recent shipments of the Newton Cupola reported by the Northern Engineering Works, Detroit, Mich., are one 6-ton to Dake Engine Company, and one to Middleby Automobile Co., one 5-ton to Michigan Crucible Steel Castings Company, one 12-ton to Southern Iron & Steel Company, and one to Modern Foundry Company, one 1-ton to Washington University. A very large increase in sales of these cupolas is reported for the past season.

A new firm of electroplaters has been formed in Newark, N. J., consisting of Robert E. Lee & Company. The firm have established themselves in quarters at 13 Franklin street, where they have ample facilities as regards space and up-to-date machinery for performing all kinds of coloring of jewelry and plaiting, polishing and finishing of metals in general. Robert E. Lee, of the firm, was for the past fourteen years connected with Jeandheur Brothers, of Newark, and also with Fred Jeandheur, Jr., of New York.

Miner & Peck Manufacturing Company, proprietors of the Peck Drop Press Works and manufacturers of Peck's patent drop lifter, drop presses for all purposes, blast forges and windgates, New Haven, report that they have had a very busy year, that they have been rushed to their utmost capacity during the year and now have two months work ahead and considerable more in sight. During the coming year they will be obliged to increase their capacity to take care of the orders they anticipate to receive.

Rockhill & Vietor, 114 John street, New York, have appointed the Bennett-O'Connell Company, Chicago, Ill., sole Western selling agents for the "Nonesuch" Electro Plating Machine. The Bennett-O'Connell Company's territory will include all the country west of and including Buffalo, N. Y. This firm has been so highly impressed by the superior merits of the Nonesuch plating machine and with the success which it has already attained that they have decided to handle it exclusively, and will under no circumstances handle any other apparatus of a similar kind.

The announcement is made that the entire interest of the Allyne Brass Foundry Company, of Cleveland, Ohio, in the metal scavenger Homogen has been purchased by Charles P. Mebane, the manager of Homogen Department of the Allyne Brass Foundry Company. The name of the new company will be the Homogen Manufacturing & Supply Company, and Mr. Mebane reports that the outlook for business in the future is very bright. The sales of Homogen for December, 1910, exceeded those for December, 1909.

The Loeb Electro Chemical Company have established their office at 467 Greenwich street, New York. This will be the headquarters of Walter Loeb, formerly of the Zucker & Levett & Loeb Company. Mr. Loeb will be glad to meet old customers and friends at this office. The company is prepared to furnish everything required by electro platers and polishers. Their new office is in a very accessible neighborhood, being only a short distance from the Desbrosses street ferry and elevated railroad station, and street cars pass the door. Mr. Loeb will make an extensive trip West in January in the interest of the business.

The Fulton Brass Foundry, F. H. Fulton proprietor, is now snugly in an enlarged foundry in South Bend, Ind. The improvements in the plant necessary for the operations of this company include an additional concrete block building which gives the plant a total floor area of 35,000 square feet. The Fulton company carries on a jobbing trade in brass, bronze, aluminum and other metals. This company was formerly located on Vistual avenue in the same city, but as the business, according to Mr. Fulton, has trebled during the past year, larger quarters and larger facilities for manufacturing were absolutely necessary.

Proposals will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until 10 o'clock a. m., February 7, 1911, and publicly opened immediately thereafter, to furnish at the navy yard, Mare Island, Cal., a quantity of naval supplies, as follows: Sch. 3256: Brass, wood and machine screws.—Sch. 3257: Brass nuts, composition valves.—Sch. 3258: Salt water soap. Applications for proposals should designate the schedules desired by number. Blank proposals will be furnished upon application to the navy pay office, San Francisco, Cal., or to the Bureau. T. J. Cowie, paymaster-general, U. S. N.

The business formerly conducted under the name of United States Alloys Company, Baltimore, Md., will in the future be known as the American Alloys Company to whom all letters should be addressed 1206 American Building, Baltimore, Md. The American Alloys Company are prepared to quote market prices and enter orders for prompt shipment. All goods and formulas previously used by the United States Alloys Company will be retained by the new company. The company makes to order special alloys, also manganese copper, manganese bronze, manganese dioxide, silicon copper, aluminum bronze, chloride of zinc and fluxes for brass foundries.

The New Jersey Smelting & Refining Works, Inc., Newark, N. J., have recently made a number of improvements to their plant. These improvements include eight new roasting furnaces, four melting furnaces, and one 90-foot smoke stack. An addition of reinforced concrete is also being built to the main plant measuring 30 by 60 feet. A new electrolytic plant for the separation of gold and platinum bullion has been installed, and new blast furnaces have been put in for the exclusive use in reducing copper bearing materials. The officers of this company are H. M. Heilmann, president; Anthony J. Mayer, vice-president, and Clarence Curren, secretary and treasurer.

The Detroit Foundry Supply Company announce the following changes in the personnel of their corporation: Merrill Z. Fox has become vice-president, having resigned from the Hill & Griffith Co., of Cincinnati, O. Two new salesmen are J. H. Lyle, who will look after the States of Illinois, Wisconsin and Iowa, and H. E. Moyer, who will sell the company's supplies in Indiana, Ohio and Canada. The Detroit Foundry Supply Company, with headquarters in Detroit, and branches in St. Paul, Minn., and Windsor, Can., congratulate themselves on securing the services of the men mentioned above, whom the company state are thoroughly familiar with the foundry trade. They ask the same consideration for new representatives that has been shown their salesmen in the past.

The Bennett-O'Connell Co., 15-17 South Clinton street, is the new name of the old firm that has for the past year used the name Bennett-O'Connell-Stevens Co. Mr. Martin J. O'Connell is president of the reorganized company. Mr. O'Connell tells our representative that their business during the past year has grown fully 30 per cent over that of last year, and that the past two months has been double of what it was for the same months last year. In consequence they have been compelled to take the balance of their building, which was heretofore used by outside parties. They are now arranging for warehouse facilities on a side track to handle their large amount of car business. This firm has also opened a warehouse in Cleveland to more easily handle the business of that city and other surrounding territory. This old reliable Chicago concern has certainly grown to be a big factor in the business of furnishing supplies for polishers and platers.

FIRES

A bad fire on the morning of Dec. 16 destroyed the Mundy Building at 22 Prospect street, Newark, N. J. Among the firms that were burned out were Lebkuecher & Company, manufacturing jewelers and A. F. Meisselbach & Brothers, manufacturers of metal novelties. The total loss is estimated at $40,000.

A serious fire gutted the three upper floors of the six-story building, 176-180 Grand street, New York, on the morning of Jan. 10, causing a loss of $50,000. These floors were occupied by the Royal Metal Manufacturing Company, the Century Gas and Electric Fixture Company, and Lewis Handel, manufacturer of speed indicators.

BUSINESS TROUBLES

The affairs of the Robson Smelting Company, Buffalo, N. Y., which has gone into bankruptcy with debts of $13,813 and nominal assets of $10,500, are being settled by the Lumen Bearing Company, brass founders, who were the largest creditors. The Lumen Bearing Company are settling the claims of the various creditors by making cash payment of 50 per cent.

INCREASE OF CAPITAL STOCK

The capital stock of the Bristol Metal Manufacturing Company, Bristol, Tenn., has been increased by the issuing of $10,000 in stock, which it is said will be absorbed by the present stockholders.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Correspondence" columns.

Valvex Brass Manufacturing Company, St. Louis, Mo. Incorporators: Clarence E. Anglin, W. M. G. Gates and G. Howard Willett, all of St. Louis.

Foss Valve & Brass Manufacturing Company, St. Louis, Mo. Capital stock, $50,000. Incorporators: Clarence E. Anglin, William J. Gates and G. Howard Willett.

Economy Metals Company, Newark, N. J. Capital, $10,010. To manufacture flush valves, enamel, coat and plate metals. Incorporators: Joseph W. Putnam, Robert E. Fivey and Charles W. Haberle.

The Standard Rolling Mills, of Brooklyn, N. Y., rollers of britannia metal, have been incorporated under the same title. Capital, $3,000. Officers: I. I. Shonberg, president and treasurer; Joe Bloch, secretary.

A. Griffoul & Brothers Company, Newark, N. J. Capital, $25,000. To manufacture steel castings, manipulate metals, etc. Incorporators: A. Griffoul, Newark; J. F. Tonn and O. F. Gunz, Rutherford, N. J.

E. T. Barnum, Inc., Detroit, Mich. Capital stock, $80,000. To manufacture brass and steelwork and wire. Incorporators: Helen A. Barnum, Richard W. Yeats and Kenneth M. Woodbury, all of Detroit.

Superior Bronze Company, Pittsburg, Pa. Capital stock, $15,000. To manufacture bronze and brass castings, babbitts and all kinds of white metals, etc. Directors: Elias James, Samuel Hunt, William Wimmer and D. V. Sherlock, all of Pittsburg.

PRINTED MATTER

Britannia Metal.—The Standard Rolling Mill, 363 Hudson avenue, Brooklyn, N. Y., have issued a large calendar, which shows the moon's phases, all holidays, etc., and other useful information. This concern manufactures Britannia metal, sheet block tin, pewter, music and title plates, etc.

Foundry Supplies, Etc.—Osborn catalogue 131 has been issued by the Osborn Manufacturing Company, of Cleveland, Ohio. The very complete line of foundry supplies, molding machines, brushes, brooms and hardware specialties manufactured and handled by this company are thoroughly illustrated and described in the 240 pages of the catalogue. Copies of catalogue No. 131 will be mailed upon request.

Graphite.—The Joseph Dixon Crucible Company, Jersey City, N. J., issue a booklet "12-A," which contains a lot of useful information for crucible users. This concern, established in 1827, and the oldest and largest graphite concern in the world, make, in addition to their crucibles, which are advertised in this issue, a complete line of foundry facings, which are also well known throughout the country.

Welding.—A description of the welding of aluminum, brass and copper sheet metal is given in the booklet just issued by the Superior Welding Company, Stamford, Conn. This company illustrates the welding work that they are performing upon all kinds of automobile castings such as crank cases and cylinders, whether the metals be cast iron, aluminum, brass or copper. Copies of this booklet will be sent upon request.

Modern Grinding and Polishing Machinery is described in a 16-page catalogue issued by the Webster & Perks Tool Company, manufacturers of multiple spindle and special tapping machinery, etc., of Springfield, Ohio. In the catalogue full descriptions of bench and floor grinders and buffing and polishing lathes are completely described by means of specifications and prices. Copies of this catalogue will be sent upon request.

Note Book.—Hendricks Brothers, 49 Cliff street, New York, who are manufacturers, dealers and importers of metals in various forms, and have been engaged in the metal business for about one hundred years, have issued their yearly note book. The 1911 edition, as in former years, contains much interesting information regarding copper, also some handy references, statistics, maps of the world and the population of cities. All is neatly bound in a little red book, which can be slipped into the vest pocket.

Platers' Supplies.—Bennett-O'Connell Company, 15-17 South Clinton street, Chicago, Ill., have issued several booklets that are sent free on request, and that contain a great deal of valuable information for platers and polishers. General catalogue No. 5 describes dynamos and general equipment and supplies. Special bulletin No. 102 is devoted to polishing and buffing machinery and supplies. Bulletin No. 30 relates to improved means of reducing costs in the plating room. This company was recently appointed sole Western selling agents for the Nonesuch electroplating machine.

Bearing Metal.—The subject of a 20-page art catalogue issued by the Lumen Bearing Company, brass founders of Buffalo and Toronto, is "Bearing Alloys." This company manufactures Lumen bronze, which is well known as an anti-friction metal that has stood the tests of the mechanical market for some time. This metal, as well as their other metals, is guaranteed to be made from new metals, pure Lake copper, Straits tin, etc.; thus ensuring uniform analysis and thorough reliability. This catalogue may be obtained by corresponding with the Lumen Bearing Company, Buffalo, N. Y., and inquiring for catalogue.

Friction Clutches.—The Carlyle Johnson Machine Company, Manchester, Conn., Catalogue "E," 1911, 35 pages, 4½ × 7 inches. An issue of 25,000. The catalogue is enlosed in a handsome cover of two-toned blue, with a clutch cut and company monogram embossed thereon, and is filled with attractive illustrations showing the Johnson Clutch, factory views, etc. The inside pages have an attractive blue border to correspond with the blue cover, this border being made up of reduced cuts of Johnson Friction Clutches, with the headings at the top of the company name and address, as always used in their trade paper advertising.

Foundry Supplies.—F. B. Stevens, manufacturer and dealer in foundry supplies, Detroit, Mich., has issued No. 7 catalogue for buyers of foundry facings, foundry supplies, buffing compositions and platers' supplies. This catalogue is handsomely bound in boards, and contains 702 pages, including an extensive alphabetical index. The very numerous articles required in the foundry and plating industries are thoroughly illustrated and described in the pages of the book. Everything necessary for the successful founding, molding, plating, finishing and polishing is carried by this firm, and copies of the catalogue wil be sent to those interested.

Brass Goods.—The Kelly & Jones Company, manufacturers of brass and iron goods and specialties for steam, gas, water and oil have issued their price list and catalogue "K" for 1911. This catalogue is claimed to be the most complete ever issued in the interests of plumbers' and steam and gas fitters' supplies. The catalogue contains 454 pages, and is bound in heavy boards, covered with red cloth. The entire line of manufactures of the

Kelly & Jones Company is covered in the pages of the catalogue. This line includes the regular standard cast iron, malleable iron and brass goods and many new styles of valves and fittings, while a new union just being made by this company is particularly featured on page 98, by being illustrated in colors, and a complete text description is given. The union is copper covered, malleable iron, and is known as the "Norustocta." The book will be sent free upon request by inquiring for catalogue "K."

AD NEWS

A. Allan & Sons, 492 Greenwich street, New York, have a very striking two-page advertisement in this issue, which gives some facts regarding Allan metals.

The Grasselli Chemical Company, manufacturing chemists, Cleveland, O., and New York City, are advertising their products in this issue. Their Department T gives full particulars.

Divine Brothers Company, polishing engineers, 43 Whitesboro street, Utica, N. Y., begin in this issue to advertise their polishing and buffing wheels.

Leiman Brothers, 62J John street, New York, have just put on the market an improved device for collecting the dust from polishing and buffing wheels.

The Hanson & Van Winkle Co., Newark, N. J., in addition to advertising their usual specialties, call attention to their complete line of lacquers described in Bulletin 119.

The Ideal Furnace Company, Chester, Pa., show an excellent view of a battery of Ideal furnaces installed at the plant of the Duplex Metals Company. Circular "I F" gives full particulars.

The Scovill Manufacturing Company, Waterbury, Conn., have a large advertisement calling attention to their facilities for manufacturing specialties in brass, German silver and aluminum.

The Newport Sand Bank Company, Newport, Ky., requests users of high grade molding sands to write Department M. for samples and prices of their Numbers 4, 5 and 6 before purchasing elsewhere.

The W. S. Rockwell Company, 50 Church street, New York, invite requests for their catalogue No. 28, describing Rockwell furnaces, which they make for melting, annealing and almost every other purpose.

H. J. Astle & Company, Providence, R. I., who are advertising Boland specialties in this issue, are one of the best known supply houses in the manufacturing jewelry and metal goods trades. Booklet Bl is sent on request.

The W. W. Sly Manufacturing Company, Cleveland, O., has a half-page advertisement illustrating and describing their cinder crusher, which is well known to the brass foundry trade. Circular "C M" gives full particulars.

Bruce & Cook, 190 Water street, New York, who are known all over the country as dealers in all kinds of ingot and sheet metals, are celebrating the beginning of their one hundredth year in business under the same roof.

Fitz, Dana & Brown, 110 North street, Boston, Mass., importers and dealers in metals, carry a large stock of metals of every kind at their Boston headquarters. By addressing Department A full particulars can be obtained.

The Eclipse Air Brush Company, Bloomfield, N. J., have recently made arrangements to market on a large scale their patent air brush for spraying lacquer, enamel, japan, varnish, paint, etc., which is described in their circular E I.

The American Concentrator Company, Joplin, Mo., call attention to their jigging and magnetic methods of reclaiming metal from cinders and sweepings. They invite metal users to write to their department A for further information.

Walter MacLeod & Co., Cincinnati, O., advertise the Buckeye brass melting furnace for oil or gas. These furnaces with complete equipment are sold for $280, or the furnace alone for $100. Other information is given in their circular "F."

The Cleveland Tensilite Company, 1314 Brownell Court, Cleveland, O., are advertising "Tensilite," which they state is the purifier and scavenger par-excellence for ferrous and non-ferrous metals. Their pamphlet T-I gives full particulars.

The Brown Specialty Machine Company, 546 Jackson Boulevard, Chicago, Ill., are advertising the Hammer Core Machine, and request foundrymen to send for their catalogue H, which will tell them how to reduce the cost of making cores.

H. A. Stiles & Co., 161 High street, Boston, Mass., are advertising Ottoman Brand Emery, which they state is the cleanest, most even-grained, fastest-cutting Turkish emery manufactured. Further particulars can be had from their Emery Department.

W. N. Best, 11 Broadway, New York, who is known all over the country as an expert on fuels, burners and furnaces, is advertising in this issue. Those interested in the heat treatment of metals, ladle heating, core ovens, etc., should write for pamphlet F-I.

The chemical department of M. Ames, Glens Falls, N. Y., solicits orders for nitrate and chloride of silver and pure chloride of gold, of which they are manufacturers. This old reliable concern is in a position to furnish these materials of the best quality.

The Bilz Sand Mixing & Sifting Machine Company, 1314 Findlay avenue, New York, illustrate their model number 2, which is particularly suitable for brass foundries. Their circular B. M. gives letters from a number of large foundries where their machines are used.

The National Aluminum Works, of Wellsville, N. Y., make an attractive announcement in a half-page two-color display. They are ready to manufacture almost anything in aluminum in every form from casting to the final finishing. They also have a model die and tool room.

The Famous Manufacturing Company, East Chicago, Ind., are advertising the Champion Cabbaging Press, which they state is a very practicable machine for pressing brass and copper scrap into the proper sizes and shapes for crucible charges. Pamphlet C-P gives full particulars.

The Sterling Wheelbarrow Company, West Allis, Wis., have a page full of illustrations showing a variety of rolled steel flasks, of which they manufacture enormous quantities. Their new catalogue "F-1," which fully describes these and other foundry equipment, will be sent on request.

A. S. P. Soldering Fluid, which is a substitute for acid, is advertised by The Alfred Spice Process, 250 North Fifth street, Philadelphia, Pa., who offer to send samples to those interested in soldering, zinc, copper, brass, tin, galvanized iron and alloys, who will write to Department A. S. P., for them.

The Diamond Clamp & Flask Company, manufacturers of pattern shop and foundry supplies, Richmond, Ind., are advertising the Diamond Snap Flasks, which are furnished with either steel slip jackets or bands for hand or machine work. Their department F will furnish further information and prices.

The American Wire Brush Company, 277 Greenwich street, New York, announced recently that on account of manufacturing in larger quantities they have been enabled to make material reductions in the price of the metal hubs used in the "Mez" patent sectional wheel brushes, of which they are exclusive manufacturers

The Naulty Smelting & Refining Company, Philadelphia, Pa., who control the process of manufacturing Chromax Bronze, a new alloy composed of chromium, nickel and copper, which possesses many excellent qualities that it is claimed are not found in any other alloy, are advertising in this issue. Their pamphlet C. B. gives further particulars.

The Peck Drop Press Works, New Haven, Conn., who manufacture a well-known line of drop presses, are calling attention in this issue to the Peck Automatic Drop Lifter with which better and more work can be secured than is possible by any other means. They invite all concerns using drop presses to send for their loose leaf catalogue "T. M. I."

R. F. Lang, 31 Broadway, New York, invite those interested in phosphor, manganese or silicon copper to send for circular "M. J.," which fully describes "Royal" bronzes, metals which are famous all over the country for their fine quality. This concern also furnishes Ferrool Hocksit, a hard solder for cast iron, which is fully described in their booklet "F. H."

The Machinery Division of The Blake & Johnson Company, Waterbury, Conn., call attention to the Waterbury Grinder, which costs only $50, including wheels and counter, and which for twenty years has been very successfully and profitably used in tool rooms and for die making and surface grinding. Blake & Johnson's circular "W. G." gives full particulars.

Fritz A. Schulz, 218 North Jefferson street, Chicago, Ill., invites interested concerns to write to department "B" for full particulars relating to his spinning lathes and other machinery for brass and metal works. This line includes polishing lathes, spinning machines, pipe threaders, disc grinders, coppersmith power hammers, horn punch presses and metal spinning tools

H. W. Lamport & Co., electro chemical equipment and accessories, 27 South Clinton street, Chicago, Ill., announce in this issue a new special nickel alloy, non-corrosive and of high tensile strength, which has the appearance of nickel plate, and which they state has a decided advantage over nickel plating in that it will not peel or wear through. Further particulars in their pamphlet A3.

The J. Bishop Platinum Works, refiners and manufacturers of platinum, Malvern, Pa., were the first platinum works to be established in the United States. They furnish platinum for any purpose, such as sheet, wire, foil, crucibles and chemical apparatus, electrodes, dishes, alloys, salts and solutions, and purchase platinum scrap. Estimates can be secured by writing their department P.

The American Metal Company, Ltd., 52 Broadway, New York, who are well known as one of the largest metal concerns in the country, announce in the advertising pages that they have been appointed sole agents for all French producers of aluminum. They will be glad to quote prices to any responsible user of aluminum. They also furnish high grade manganese copper free from iron.

The Ajax Metal Company, Philadelphia, Pa., who are regular advertisers, have increased their space and are emphasizing the fact that Ajax Metal is scientifically prepared under chemical supervision, and has been found by the largest consumers to be equivalent in quality to the use of new metals. Inquiries addressed to the Ajax Metal Company, Department I, will receive prompt attention.

The double-page spread of the U. S. Electro Galvanizing Company, 1-9 Park avenue, Brooklyn, N. Y., at the front of this number of THE METAL INDUSTRY, shows galvanizing plants installed by them for F. W. Bird & Son, Walpole, Mass., the Safety Armourite Conduit Company, Pittsburg, Pa., and the Babcock & Wilcox Company, Bayonne, N. J. Galvanizing concerns who desire particulars regarding the U. S. Electro Galvanizing process and apparatus should address their department "G."

Hugh McPhee, 57 John street, Tarrytown, N. Y., the inventor of a patented process for mounting patterns on plates, which was recently described in THE METAL INDUSTRY, offers in his advertisement this month to demonstrate his method to any foundry that will send a pattern and a flask that they are now using in their molding machines and permit him to mount the pattern on plates according to his method. Mr. McPhee's invention has attracted a lot of attention, and his methods have been adopted by some prominent concerns.

METAL MARKET REVIEW FOR 1910—OUTLOOK FOR 1911

NEW YORK, JANUARY 16, 1911.

BY J. J. ARCHER.

1910.

In writing a review of the metal trade of the year 1910 we would emphasize the fact that the consumption of all metals has been extraordinarily good.

The estimated consumption of copper increased from 50 to 60,000,000 pounds during the year, consumption of tin increased 3,850 tons, lead shows an increase of about 14,000 tons and the consumption of spelter is about normal.

The year 1910 opened on the top of a wave of artificially expanded business activity that started in the late fall of 1909. The general feeling of optimism did not last very long and gradually gave way to a feeling of pessimism that still pervades the country at large. Before the end of the first month of 1910 active liquidation began in Wall Street, and leading securities declined from 10 to 20 points. The general trade of the country was slower to realize the artificial conditions.

Iron and steel in January was apparently in the full flush of the late bob-tailed boom, pig iron production was at the rate of 31,796,000 tons a year, steel makers were operating on a basis of about 85 per cent. of capacity, while at the close of the year the steel mills were barely operating at much over 50 per cent. of their capacity. In the security market Amalgamated declined from 90¾ in January to 61⅝ at the close, Steel from 91 in January to 72⅛ at the close. It is to be noted that Amalgamated touched 55⅛ in July, the low point of the year, and Steel sold at 61⅛, the same month. The year 1910 was decidedly disappointing from start to finish. Considering the fact that in face of all the pessimism of 1910, the political "unrest," the decision of the Supreme Court in the Standard Oil and Tobacco suits, still to come, the consumption of all metals during this year of bug-a-boos and fears shows a normal increase.

1911.

We predict that the year 1911 will get away from these really imaginary evils and that the people will "find themselves," confidence will return and business will easily adjust itself to whatever conditions may arise and then go ahead.

Is there anything to fear in the future? To start with we have just harvested a crop that brought us over $9,000,000,000. This is not a theory or a shadow but a fact and yet the whole country is really worrying about a shadow. The railroads and the Interstate Commerce Commission, we believe rates will be adjusted on a fair and equitable basis. Regarding the Supreme Court and the two Trusts, the Court is not going to confiscate the properties of either corporation or of their stockholders. It is quite possible there may have to be a readjustment or a reorganization. It is more than probable that the Standard Oil has already evolved a plan to shuffle the cards and keep the game going, and the Tobacco people the same way. We have actually seen this thing carried out in the case of the Temple Iron Company.

The only unsettling issue is the possible tariff revision, but outside of that we maintain that basic conditions are most favorable. The country has gone through a year of liquidation and contraction and conditions favor a return to normal activity in all lines of business.

COPPER.

The most important event in the history of Copper for the year 1910, or of any previous year, was the friendly agreement or understanding supposed to have been arrived at among the larger producers to restrict production. There has been no sudden or violent shutdown, in fact only a slight curtailment has been noticeable, but this has been sufficient to give consumers confidence in the future of the metal, and large orders were placed when this policy of restriction seemed first to become evident. It is true the buying during the last few months of the year has been anything but active, owing probably to the growing feeling of pessimism and unrest already referred to above. The Copper market today is in good shape statistically, and while there are a few lots in second hands being offered at a slight decline in price the larger selling agents are holding firm at around 13 cents for Lake brands. After the publication of the December statistics the market became easier.

The year opened with a stock of marketable copper on hand of about 140,000,000 pounds. The price then ruling was 14 cents for Lake, 13¾ Electrolytic and 13⅝ for Casting brands. These were the highest figures of the year. As the production seemed to be steadily increasing and stocks continued to accumulate prices gradually sagged off to 12½ for Lake, 12¼ for Electrolytic and close to 12 cents for casting.

When it became apparent that the output was being restricted, prices gradually advanced to around 13 cents for Lake, and that is the nominal market today.

From statistics and estimates received by the United States Geological Survey, the production of blister copper from domestic ores and from all the Lake mines in 1910 was 1,079,000,000 pounds, as against 1,092,951,624 pounds in 1909.

The European statistics of copper show a visible supply of 83,800 tons of 2,240 pounds, as compared with 109,020 tons a year ago. According to these figures the stocks of copper in England and France have decreased during the year 25,224 tons or 56,492,800 pounds. There is a stock of copper being carried in Hamburg that does not show in these foreign statistics, and this stock is estimated at around 50,000,000 pounds. There is no question, however, but that the European consumption of copper has increased considerably during the year.

The exports for the year, according to Custom House returns compiled by the New York Metal Exchange, were 301,935 tons compared with 301,657 tons during 1909, an increase of 278 tons. According to the figures of the Copper Producers' Association, the exports for the year 1909 were over 303,000,000 pounds, showing an increase of about 2,000,000 pounds over the exports as reported by the Metal Exchange. This difference in exports gradually disappeared during the first three months of 1910. During the last four months of 1910 the exports as published by the Producers' Association, have shown an increase over the figures as published by the Metal Exchange, and at the close of the year there is a difference of over 46,000,000 pounds; the Metal Exchange exports total 676,110,400 pounds against 722,431,494 pounds as published by the Copper Producers' Association. This difference of over 46,000,000 pounds is quite a serious item, and if the Copper Producers' Association's figures are to be taken as absolutely correct an explanation should be in order. The figures published by the Metal Exchange are very carefully compiled each day from Custom House returns, and have been confirmed by the United States Geological Survey. In 1909 the Metal Exchange exports were 304,909 tons, while the United States Geological Survey reported 304,842 tons, a difference of only 67 tons. The exports as compiled by the Geological Survey for 1910 are not available yet. The imports of copper for the year will total about 150,000 tons (December estimated), as compared with 145,000 tons in 1909.

According to the Copper Producers' Association's figures, we started with a stock on hand Jan. 1, 1910, of 141,766,111 pounds, today we have a stock of 122,030,195 tons, showing a decrease for the year of 19,735,916 tons. Production amounted to 1,452,122,120 tons, and deliveries total 1,471,858,036 pounds, made up of 749,426,542 tons for domestic consumption, and 722,431,494 pounds for export. On this basis it looks as though consumption had overtaken production, but there is the matter of excess exports to be adjusted, and 46,000,000 pounds will give quite a different complexion to the year's business. Most of this enormous disparity seems to have accumulated in the figures for the month of December. In the table published below domestic consumption for December was only 43,594,018 pounds. This is nearly 20,000,000 pounds below the average monthly consumption, while the exports are 88,104,075, or more than 20,000,000 pounds above the monthly average for the year. The figures, as published for the month of December, are a great disappointment to the trade—first, because production shows an increase of 4,000,000 pounds over the September output; second, on account of the small domestic consumption, and third, because the large exports can only mean a transfer of stocks from America to Europe, and cannot be classed as consumption.

The outlook for 1911 is for increased production from mines that will be in shape early in the year, but with normal business conditions consumption should certainly increase sufficiently to take care of this possible increase.

TIN.

Pig tin being an imported metal, its history is all made in the London market, where the different speculative cliques have been able to manipulate prices at the expense of the American consumer.

A year ago there was a total visible supply of tin of 20,918 tons, and the price in New York was around 32½ cents. At the end of December there was a total visible supply of 17,194 tons, and the price was 38½ cents. We have consumed during the year 45,350 tons, as compared with 41,500 tons during 1909. The total arrivals of tin were 44,323 tons, compared with 40,519 tons in 1909. On the first of January 1911 we had a stock of tin on spot of 854 tons, with 2,193 tons afloat. Less than half this "afloat" tin can get to this market during January, and as our consumption averages each month about 3,700 tons we shall have to draw on London for our supplies to the extent of at least 2,000 tons during the present month. It is easy to see that the "bull" crowd in London can put the price of tin very much higher. It is even predicted that tin will go to 45 cents before the end of February.

In connection with the very high prices for pig tin it is peculiar of the Chinese (as previously attested by the late Bret Harte) that the more money they get for their tin the less they will mine. As long as they get just so much money they are satisfied. So the higher the price goes the less tin comes out. There is no question of any shortage of supplies. The success of the scheme lies in the fact that the English operators in tin know the Chinese basis of trading, and are playing the game to the entire satisfaction of the Chinese tin mine owners, and the whole expense of the game comes out of the pockets of the American consumers, and the end is not in sight. Today tin is 40 cents, and less will come out. Next month tin, say, is 45 cents, and then what?

Tin once consumed is gone for ever; it is not like copper that comes back into the market several times over. There is very little tin that can be used again.

Today the price of tin in London is £184, compared with £153 a year ago, and £132 in January, 1909. In the New York market tin is around 40 cents per pound. The average price of spot tin in London for the year was £159 5s. 7d. against £134 15s. 9d. in 1909.

The present bull syndicate in London began operations in August. The stocks in America were easily controlled. During the next two months the short interests in London were taught a lesson in a very expensive school. During November and December the syndicate obtained complete control, and at the same time had the sources of supply ready and willing to co-operate on the automatic plan already explained.

The history of tin for the year 1910 is not very entertaining reading for American consumers, but there is no getting away from the facts.

LEAD.

The United States Geological Survey estimates the production of refined lead from domestic and foreign ores during 1910 at 469,682 tons of 2,000 lbs., as compared with 448,112 tons in 1909. What the consumption of lead has been is probably known to the lead trust, and they won't tell. There is no way of getting at the consumption of lead; we know there was a large stock in hand a year ago, and from "inspired" sources today we are told the accumulations have all been worked off.

The price movement during the year has not been very violent. A year ago lead was selling at close to 4.70 New York. Prices

reached 4.75 and then gradually declined to 4.35 in May; later in the summer prices advanced to 4.40, and at the close of the year 4.50 New York was the marked quotation.

SPELTER.

The United States Geological Survey estimate the production of spelter during 1910 from domestic and foreign ores at 267,423 tons of 2,000 lbs., as compared with 255,760 tons during 1909. According to these figures we should have a stock on hand of 22,800 tons against a stock on hand a year ago of 11,500 tons.

The production of spelter this year was the largest on record, while the apparent consumption was not as heavy as in 1909.

The price movement during the year has been rather erratic. Opening at around 6¼ New York prices declined about 1 cent per pound during February. Prices advanced again during March, and held fairly steady at around 5.60 to 5.65 New York, until about November, when a concerted movement by the three leading interests ran the price up to around 6.35. This price did not hold very long, and gradually declined again to 5½ at the close of the year.

ALUMINUM.

The demand for aluminum during the first six months of the year was fairly good, and prices steadily advanced. Later on the demand slackened considerably owing probably to the general unrest and the falling off in the demand for automobiles. The business was probably overdone in the fall of 1909 and the first few months of 1910, but at the moment there is very little doing. Prices have shown a steady improvement caused by a combination of the leading English and American interests. The market today is around 22 cents to 22¼ as compared with 21¾ a year ago.

ANTIMONY.

The antimony market during the year has been very uninteresting. Cookson's opened 8½ cents and Hallett's at 8¼. These prices held fairly steady until late in the year, when Cookson's put the price down to 7½ cents and the other brands followed. Cooksons early in January was advanced again to 8¼ cents. Closing: Cookson's 8¼, Hallett's 7½, Chinese 7¼, Hungarian 7⅛.

SILVER.

The price of silver during the year has gradually advanced from 52 cents in January, 1910, to 54½ today. The average price for the year in New York was 53.48, as compared with 51½ for 1909. In London the average was 24.67 against 23.70 for 1909. The United States Government purchases during the year amounted to 200,000 ounces.

QUICKSILVER.

The production of quicksilver in 1910, as estimated, showed a small increase, being 21,500 flasks against 20,952 flasks in 1909.

Prices during the year have steadily declined. Opening at $52 per flask New York, the quotation today is $42. The demand has been fairly good, there being no accumulation of stock on hand today.

PLATINUM.

The imports for the year 1910 were 122,820 ounces (December estimated), as compared with 114,916 ounces in 1909. Prices have steadily advanced during the year. Opening at $29 for ordinary refined, prices advanced to over $39 per ounce in November, and later declined $1, and the market closes at $38.50 for ordinary refined, and $41 for hard 10 per cent. iridium.

SHEET METALS.

There have been very slight fluctuations in the base price of sheet copper or wire. The nominal quotation for sheet copper has stood at 18 cents base. The price has been cut about 2 cents. This has naturally demoralized the trade in the East, and the market is more or less unsettled. Wire is quoted 14¼ base, high sheet brass at 14¾, seamless copper tubing at 21 cents, and seamless brass tubing at 18 cents base.

OLD METALS.

The old metal market has not been very satisfactory. With the declines in copper prices early in the year, all scrap copper and brass prices declined, and during the balance of the year consumers have been buying only as needed. Fluctuations have been small and profits have naturally been on about the same basis.

It is hoped that the year 1911 will offer greater opportunities.

COPPER PRODUCTION

(Issued by the Copper Producers' Association.)

	January 9, 1911. Pounds.
Stocks of marketable copper of all kinds on hand at all points in the United States, Dec. 1, 1910....	130,389,069
Production of marketable copper in the United States from all domestic and foreign sources during December, 1910	123,339,219
	253,728,288
Deliveries:	
For domestic consumption..... 43,594,018	
For export 88,104,075	
	131,698,093
Stocks of marketable copper of all kinds on hand at all points in the United States, Jan. 1, 1911....	122,030,195
Stocks decreased during the month of December...	8,358,874

SUMMARY FOR THE YEAR 1910.

The total production was 1,452,122,120 pounds, deliveries 1,471,858,036 pounds, domestic consumption 749,426,542 pounds, and exports 722,431,494 pounds. These figures show a reduction of 19,735,916 pounds during the year.

DECEMBER MOVEMENTS IN METALS

	Highest.	Lowest.	Average.
COPPER.			
Lake	13.00	12.75	12.90
Electrolytic	13.00	12.50	12.75
Casting	12.90	12.40	12.60
TIN	38.80	37.65	38.30
LEAD	4.50	4.45	4.45
SPELTER	6.05	5.55	5.75
ANTIMONY (Hallett's)	7.75	7.50	7.70
SILVER	.55	.53⅞	54.45

SHEET METAL MOVEMENTS YEARS 1908—1909—1910

Highest and lowest base prices (in cents per lb.) on sheet brass, sheet copper and sheet German silver.

	1908.		1909.		1910.	
	High.	Low.	High.	Low.	High.	Low.
Sheet brass....	16.00	13.25	16.00	13.00	15.25	13.25
Sheet copper...	20.00	17.00	19.00	17.00	19.00	18.00
Sheet German silver, 18%...	32.50	24.50	25.50	24.50	25.50	24.50

WATERBURY AVERAGE

The average price of lake copper per pound as determined monthly at Waterbury, Conn.

1910.—Jan., 13⅞. Feb., 13⅞. March, 13¾. April, 13¼. May, 13. June, 12¾. July, 12¾. Aug., 12¾. Sept., 12¾. Oct., 12⅞. Nov. 13. Dec. 13. Average for year, 13.13½.

DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Metal Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the report alone is $10. Sample copies furnished for the asking. We can furnish daily telegraphic reports of metal prices. Address THE METAL INDUSTRY, 99 John street, New York.

INQUIRIES AND OPPORTUNITIES

Under our directory of "Trade Wants" (published each month in the back advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds. See Want Ad. pages.

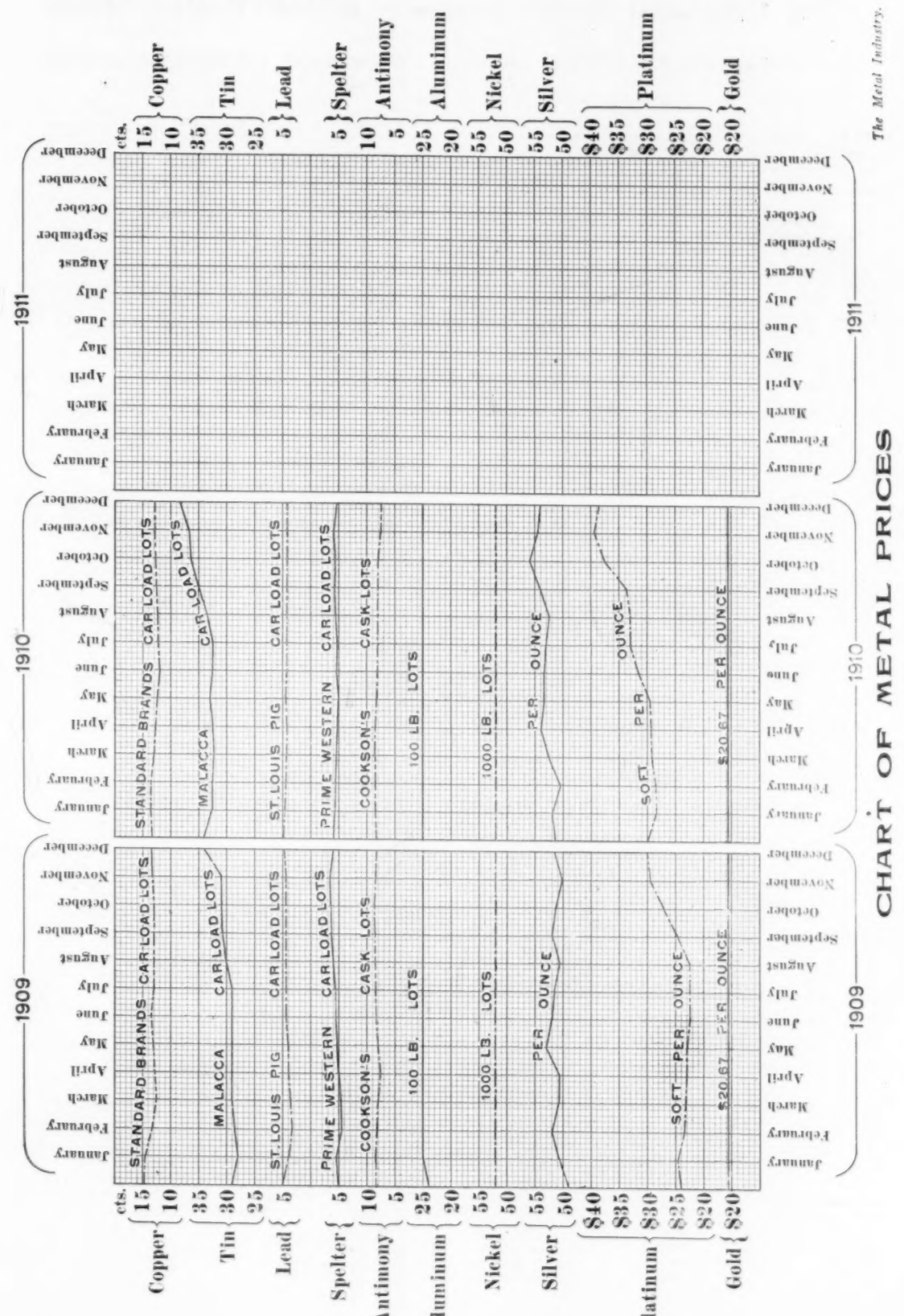


CHART OF METAL PRICES
The Metal Industry.
1909
1910
1911
January
February
March
April
May
June
July
August
September
October
November
December
cts.
15 } Copper
10
35 } Tin
30
25 } Lead
5
5 } Spelter
10 } Antimony
5
25 } Aluminum
20
55 } Nickel
50
55 } Silver
50
$40 } Platinum
$35
$30
$25
$20 } Gold
$20
STANDARD BRANDS CARLOAD LOTS
MALACCA CARLOAD LOTS
ST. LOUIS PIG CARLOAD LOTS
PRIME WESTERN CARLOAD LOTS
COOKSON'S CASK LOTS
100 LB. LOTS
1000 LB. LOTS
PER OUNCE
SOFT PER OUNCE
$20.67 PER OUNCE

Pig Iron and Metal Products of the United States

Calendar Years 1901-1908. (1909 and 1910 Estimated.)

(FROM THE UNITED STATES GEOLOGICAL SURVEY.)

PRODUCTS. METALLIC.	1901. Quantity.	1901. Value.	1902. Quantity.	1902. Value.	1903. Quantity.	1903. Value.	Products.
Pig iron (spot value) long tons	15,878,354	$242,174,000	17,821,307	$372,775,000	18,009,252	$344,350,000	Pig iron.
Silver, commercial value, troy ounces	55,214,000	33,128,400	55,500,000	29,415,000	54,300,000	29,322,000	Silver.
Gold, coining value, troy ounces	3,805,500	78,666,700	3,870,000	80,000,000	3,560,000	73,591,700	Gold.
Copper, value at New York City, pounds	602,072,519	87,300,515	659,508,644	76,568,954	698,044,517	91,506,006	Copper.
Lead, value at New York City, short tons	270,700	23,280,200	270,000	22,140,000	282,000	23,520,000	Lead.
Zinc, value at New York City, short tons	140,822	11,265,760	156,927	14,625,596	159,219	16,717,995	Zinc.
Quicksilver, value at San Francisco, flasks	29,727	1,382,305	34,291	1,467,848	35,620	1,544,934	Quicksilver.
Aluminum, value at Pittsburg, pounds	7,150,000	2,238,000	7,300,000	2,284,590	7,500,000	2,284,900	Aluminum.
Antimony, value at S. F'cisco, short tons	2,639	539,902	3,561	634,506	3,128	548,433	Antimony.
Nickel, value at Philadelphia, pounds	6,700	3,551	5,748	2,701	114,200	45,900	Nickel.
Tin, pounds	.....	.....	.....	.....	.....	.....	Tin.
Platinum, value (crude) at New York City, troy ounces	1,408	27,526	94	1,814	110	2,080	Platinum.
Total value of metallic products	.....	$480,006,959	.....	$599,916,009	.....	$583,433,948	

PRODUCTS. METALLIC.	1904. Quantity.	1904. Value.	1905. Quantity.	1905. Value.	1906. Quantity.	1906. Value.	Products.
Pig iron (spot value) long tons	16,497,033	$233,025,000	22,992,380	$382,450,000	25,307,191	$505,700,000	Pig iron.
Silver, commercial value, troy ounces	57,682,800	33,456,000	56,101,600	34,221,976	56,517,900	38,256,400	Silver.
Gold, coining value, troy ounces	3,892,480	80,464,700	4,265,742	88,180,700	4,565,333	94,373,800	Gold.
Copper, value at New York City, pounds	812,537,267	105,629,845	901,907,843	139,795,716	917,805,682	177,595,888	Copper.
Lead, value at New York City, short tons	307,000	26,402,000	302,000	28,690,000	350,153	39,917,442	Lead.
Zinc, value at New York City, short tons	186,702	18,670,200	203,849	24,054,182	199,694	24,362,668	Zinc.
Quicksilver, value at San Francisco, flasks	34,570	1,503,795	30,451	1,103,120	26,238	958,634	Quicksilver.
Aluminum, value at Pittsburg, pounds	8,600,000	2,477,000	11,347,000	3,246,300	14,910,000	4,262,286	Aluminum.
Antimony, value at S. F'cisco, short tons	3,057	505,524	3,240	705,787	1,766	602,949	Antimony.
Nickel, value at Philadelphia, pounds	24,000	11,400	.....	.....	.....	.....	Nickel.
Tin, pounds	.....	.....	.....	.....	.....	35,600	Tin.
Platinum, value (crude) at New York City, troy ounces	200	4,160	318	5,320	1,439	45,189	Platinum.
Total value of metallic products	.....	$502,149,624	.....	$702,453,101	.....	$886,110,856	

PRODUCTS. METALLIC.	1907. Quantity.	1907. Value.	1908. Quantity.	1908. Value.	1909. Quantity.	1909. Value.	Products.
Pig iron (spot value) long tons	25,781,361	$529,958,000	15,936,018	$254,321,000	25,711,846	$437,101,382	Pig iron.
Silver, commercial value, troy ounces	56,514,700	37,299,700	52,440,800	28,050,600	54,721,500	28,455,200	Silver.
Gold, coining value, troy ounces	4,374,827	90,435,700	4,574,340	94,560,000	4,821,701	99,673,400	Gold.
Copper, value at New York City, pounds	868,996,491	173,799,300	942,570,721	124,419,335	1,450,403,056	87,280,227	Copper.
Lead, value at New York City, short tons	365,166	38,707,596	310,762	26,104,008	444,363	38,215,000	Lead.
Zinc, value at New York City, short tons	223,745	26,401,910	190,749	17,930,406	268,215	28,967,220	Zinc.
Quicksilver, value at San Francisco, flasks	21,567	828,931	19,752	824,146	20,425	943,022	Quicksilver.
Aluminum, value at Pittsburg, pounds	17,211,039	4,926,948	11,152,000	2,434,600	15,000,000	3,750,000	Aluminum.
Antimony, value at S. F'cisco, short tons	2,022	622,046	.....	.....	.....	.....	Antimony.
Antimonial Lead, short tons	9,910	1,322,985	13,629	1,264,771	12,860	.....	Antim'l lead.
Nickel, value at Philadelphia, pounds	.....	.....	.....	.....	19,284,172	10,027,769	Nickel.
Tin pounds	.....	33,285	.....	.....	.....	.....	Tin.
Platinum, value (crude) at New York City, troy ounces	357	10,589	750	14,250	.....	.....	Platinum.
Total value of metallic products	.....	$903,802,244	.....	$549,923,116	.....	$734,413,220	

1910 (ESTIMATED).

PRODUCTS. METALLIC.	Quantity.	Value. Total.	Value. Per Unit.
*Pig iron, long tons	27,295,592	$464,025,064.00	$17.00
Copper, pounds	1,471,858,036	191,341,544.68	.13
*Gold, ounces fine	464,708	96,055,214.00	20.67
†Lead, short tons	469,682	41,332,016.00	87.76
*Quicksilver, pounds	21,500	2,866,800.00	.67
*Silver, ounces fine	56,438,695	30,053,605.00	.53¼
†Zinc, short tons	267,423	28,881,684.00	108.00
*Nickel (a) pounds	29,359,544	15,266,963.00	.52
*Aluminum (b) pounds	12,000,000	3,000,000.00	.25

(a) Smelted in the United States for metal, oxide and salts.
(b) Production from ores originating in the United States.
Figures for metals marked * from Engineering and Mining Journal.
Figures for metals marked † from United States Geological Survey.

Metal Prices, January 16, 1911

NEW METALS.

	Price per lb. Cents.
COPPER—PIG, BAR AND INGOT AND OLD COPPER. Duty Free, Manufactured 2½c. per lb.	
Lake, carload lots	12.75
Electrolytic, carload lots	12.50
Casting, carload lots	12.40
TIN—Duty Free.	
Straits of Malacca, carload lots	40.00
LEAD—Duty Pigs, Bars and Old, 2½c. per lb.; pipe and sheets, 2⅜c. per lb.	
Pig lead, carload lots	4.50
SPELTER—Duty 1⅜c. per lb. Sheets, 1⅝c. per lb.	
Western carload lots	5.55
ALUMINUM—Duty Crude, 7c. per lb. Plates, sheets, bars and rods, 11c. ped lb.	
Small lots	28.00
100 lb. lots	25.00
Ton lots	22.25
ANTIMONY—Duty 1½c. per lb.	
Cookson's, cask lots, nominal	8.25
Hallett's cask lots	7.75
Other cask lots	7.15
NICKEL—Duty Ingot, 6c. per lb. Sheet, strips and wire 35% ad valorem.	
Shot, Plaquettes, Ingots, Blocks, according to quantity	.43 to .60
MANGANESE METAL—Duty 20%	.90
MANGANESE METAL—Duty 3 cents per pound and 25% ad valorem	1.60
BISMUTH—Duty free	2.10
CADMIUM—Duty free	.80
	Price per oz.
GOLD—Duty free	$20.67
SILVER—Duty free	.54¾
PLATINUM—Duty free	38.50
QUICKSILVER—Duty 7c. per lb. Price per pound	.59 to .60

OLD METALS.

Dealers' Buying Prices. Cents per lb.		Dealers' Selling Prices. Cents per lb.
11.25 to 11.50	Heavy Cut Copper	12.25 to 12.50
10.75 to 11.00	Copper Wire	11.75 to 12.00
9.75 to 10.00	Light Copper	10.75 to 11.00
9.75 to 10.00	Heavy Mach. Comp	10.75 to 11.00
7.25 to 7.50	Heavy Brass	8.25 to 8.50
5.75 to 6.00	Light Brass	6.75 to 7.00
7.25 to 7.50	No. 1 Yellow Brass Turnings	8.00 to 8.25
8.25 to 9.00	No. 1 Comp. Turnings	9.25 to 9.30
3.90 to 4.00	Heavy Lead	—— to 4.25
3.75 to 3.90	Zinc Scrap	—— to 4.25
5.00 to 5.50	Scrap Aluminum, turnings	5.00 to 6.50
10.00 to 12.00	Scrap Aluminum, cast, alloyed	11.00 to 13.00
14.00 to 15.00	Scrap Aluminum, sheet (new)	16.00 to 18.00
23.00 to 24.00	No. 1 Pewter	25.00 to 26.00
25.00 to 27.00	Old Nickel	28.00 to 30.00

INGOT METALS.

	Price per lb. Cents.
Silicon Copper, 10% to 20%.....according to quantity	28 to 35
Silicon Copper, 30% guaranteed... " "	38
Phosphor Copper, 5% ..... " "	19 to 21
Phosphor Copper, 10% to 15%, guaranteed ..... " "	28 to 30
Manganese Copper, 30% ..... " "	30 to 35
Phosphor Tin ..... " "	34 to 36
Brass Ingot, Yellow ..... " "	9 to 10
Brass Ingot, Red ..... " "	11 to 12½
Bronze Ingot ..... " "	10 to 11
Manganese Bronze ..... " "	17 to 19
Phosphor Bronze ..... " "	13 to 16
Casting Aluminum Alloys..... " "	29 to 35

PHOSPHORUS—Duty 18c. per lb.
According to quantity ..... 30 to 35

PRICES OF SHEET COPPER.

BASE PRICE, 18 Cents per Lb. Net.

PRICES MENTIONED BELOW ARE FOR QUANTITIES OF 100 LBS. AND OVER.

SIZE OF SHEETS.		64 oz. and over 50 lb. sheet 30 x 60 and heavier.	32 oz. to 64 oz. 25 to 50 lbs. sheet 30 x 60.	24 oz. to 32 oz. 18¾ to 25 lb. sheet 30 x 60.	16 oz. to 24 oz. 12½ to 18¾ lb. sheet 30 x 60.	14 oz. and 15 oz. 11 to 12½ lb. sheet 30 x 60.	12 oz. and 13 oz. 9½ to 11 lb. sheet 30 x 60.	10 oz. and 11 oz. 7¾ to 9½ lb. sheet 30 x 60.	8 oz. and 9 oz. 6¼ to 7¾ lb. sheet 30 x 60.	Lighter than 8 oz.
		Cents Per Pound Over Base Price for Soft Copper.								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	1	2	3	6	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	3	6	9	
	Longer than 96 inches.	"	"	"	"	2	6			
Wider than 30 ins. but not wider than 36 inches.	Not longer than 72 inches.	"	"	"	"	2	4	7	10	
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	2	6	9		
	Longer than 96 inches. Not longer than 120 inches.	"	"	"	1	3				
	Longer than 120 inches.	"	"	1	2					
Wider than 36 ins. but not wider than 48 inches.	Not longer than 72 inches.	"	"	1	2	4	7	10		
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	5	8			
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	8				
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins. but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	6	11			
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	9				
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Longer than 120 inches.	3	5	9						
Wider than 108 ins.	Not longer than 132 inches.	4	6							
	Longer than 132 inches.	5	8							

The longest dimension in any sheet shall be considered at its length.

CIRCLES, SEGMENTS AND PATTERN SHEETS, advance over prices of Sheet Copper required to cut them from 3 cents per pound.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot, and heavier, add ..... 1 " " "

COLD OR HARD ROLLED COPPER, lighter than 14 oz., per square foot, add ..... 2 " " "

POLISHED COPPER, 20 INCHES WIDE and under, advance over price for Cold Rolled Copper of corresponding dimensions and thickness ..... 1 " " sq. ft.

POLISHED COPPER, WIDER THAN 20 INCHES, advance over price for Cold Rolled Copper of corresponding dimensions and thickness ..... 2 " " " "

COLD ROLLED COPPER, PREPARED SUITABLE FOR POLISHING, same as Polished Copper of corresponding dimensions and thickness.

COLD ROLLED AND ANNEALED COPPER SHEETS OR CIRCLES, same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

ROUND COPPER ROD, ⅜ inch diameter or over.....Base Price.
(Rectangular, Square and Irregular Shapes, Copper Rod, Special Prices.)

	Cents per lb.
ZINC—Duty, sheet, 1⅝c. per lb.	
Carload lots, standard sizes and gauges, at mill	7.50 less 8%
Casks	8.00
Open casks	8.50

Metal Prices, January 16, 1910

PRICES ON BRASS MATERIAL—MILL SHIPMENTS,

In effect Dec. 5, 1910, and until further notice.

To customers who purchase less than 40,000 lbs. per year and over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.13¾	$0.15⅛	$0.17
Wire	.13¾	.15⅛	.17
Rod	.13¾	.15⅞	.18
Brazed tubing	.18⅝	—	.20¾
Open seam tubing	.16⅝	—	.18¾
Angles and channels, plain	.16⅞	—	.18¾

50% discount from all extras as shown in American Brass Manufacturers' Price List No. 7.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring drawing and spinning brass	⅛c.	per lb. net advance
" —Best spring, drawing and spinning brass	1⅛c.	" " "
Wire —Extra spring and brazing wire	⅛c.	" " "
" —Best spring and brazing wire	1c.	" " "

To customers who purchase less than 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.14¾	$0.16⅛	$0.18
Wire	.14¾	.16⅛	.18
Rod	.14¾	.16⅞	.19
Brazed tubing	.19⅝	—	.21¾
Open seam tubing	.17⅝	—	.19¾
Angles and channels, plain	.17⅞	—	.19¾

5% discount from all extras as shown in American Brass Manufacturers' Price List No. 7.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring drawing and spinning brass	⅛c.	per lb. net advance
" —Best spring, drawing and spinning brass	1⅛c.	" " "
Wire —Extra spring and brazing wire	⅛c.	" " "
" —Best spring and brazing wire	1c.	" " "

BARE COPPER WIRE—CARLOAD LOTS.

14¼c. per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	18½c. per lb. base
100 lbs. to 300 lbs. in one order	19c. " " "
Less than 100 lbs. in one order	20½c. " " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ in O. D. Nos. 4 to 13 Stubs' Gauge, 18c. per lb.
Seamless Copper Tubing, 21c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron pipe Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.	26	25	20	19	18	18	18	18	18	18	18	19	20	22	24	25

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet Brass.	Bronze.
⅜ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1⅛ inch	22	24
1¼ inch	25	27
1½ inch	32	35
1¾ inch	45	48
2 inch	56	60

Discount 55 and 5%.

PRICES FOR MUNTZ'S METAL AND TOBIN BRONZE.

Muntz's or Yellow Metal Sheathing (14" x 48")	14½c. net base
" " " Rectangular sheets other than Sheathing	16½c. " "
" " " Rod	14½c. " "
Tobin Bronze Rod	16c. " "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bar in the rough, 22¾c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Not over 18 in. in width, not thinner than 23 B. S. Gauge, 2c. above price of pig tin in same quantity.

Not over 35 in. in width, not thinner than 22 B. S. Gauge, 3c. above price of pig tin.

PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

	Wider than..... and including..... in coils.	3in. 12in.	6in. 14in.	14in. 16in.	16in. 18in.	18in. 20in.	20in. 24in.	24in. 30in.	30in. 36in.	36in. 40in.
No.	13 and heavier	34	34	36	36	36	36	39	39	39
"	14	34	34	36	36	36	36	39	39	39
"	15	34	34	36	36	36	36	39	39	39
"	16	34	34	36	36	36	36	39	39	39
"	17	34	34	36	36	36	36	39	39	39
"	18	34	34	36	36	36	36	39	39	42
"	19	34	34	36	36	36	36	39	40	43
"	20	34	36	36	36	36	38	41	42	44
"	21	34	38	38	38	38	40	43	44	50
"	22	34	38	38	38	40	40	43	47	51
"	23	34	38	38	38	40	40	43	49	52
"	24	34	38	40	42	42	42	45	51	54
"	25	36	39	41	43	43	43	46	53	57
"	26	36	39	42	46	46	46	51	55	61
"	27	36	40	44	48	48	49	54	58	64
"	28	36	40	46	48	49	49	56	62	67
"	29	38	41	48	50	52	52	61	67	72
"	30	38	42	50	52	56	62	69	72	77
"	31	43	47	55	58	63	71	74	77	83
"	32	45	49	57	61	69	77	91	90	95
"	33	47	51	60	65	73	84	91	100	110
"	34	50	55	62	70	78	91	103	110	120
"	35	..	65	70	80	90	100	115	125	..
"	36	..	80	90	100	115	120	135	..	..
"	37	..	104	114	129	144	159	174	..	..
"	38	..	124	139	154	169	184	204	..	..
"	39	..	144	164	184	204	224	..	..	..
"	40	..	174	204	224	244	..	..	..	..

In flat rolled sheets the above prices refer to lengths between 2 and 3 feet. Prices furnished by the manufacturers for wider and narrower sheet. All columns except the first refer to flat rolled sheet. Prices are 100 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.
Outside Diameters. BASE PRICE, 25 Cents per Pound.

Stubs' Gauge.	Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 ins.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	27	24	..	..	14	20	10	9	16	23
12.	.109.	..	..	..	..	..	..	..	26	..	..	..	15	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	17	..	..	..	..	..
16.	.065.	..	..	..	..	..	28	27	27	24	23	21	21	21	21	27	31	57
18.	.049.	..	..	..	..	33	30	29	28	25	26	26	26	..	..	..	..	..
20.	.035.	117	..	46	39	34	33	32	30	29	30	30	30	31	38	49	58	81
21.	.032.	..	..	..	40	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.	138	98	48	42	38	37	35	34	..	..	45	..	..	..	..	..	..
24.	.022.	188	133	108	88	79	75	62	60	66	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Diameter. B. & S. G'ge.	000 to No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price, per lb.	32	32½	32½	33	33½	34	34½	35	36	37	38	43	46

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12	$0.52	16	$0.58
13	.53	17	.59
14	.54	18	.60
15	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive. American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50%.

GERMAN SILVER TUBING.

4	per cent.	to No. 19,	B. & S.	Gauge,	inclusive $0.60
6	"	" 19,	"	"	" ..... .70
9	"	" 19,	"	"	" ..... .85
12	"	" 19,	"	"	" 1.00
15	"	" 19,	"	"	" 1.15
16	"	" 19,	"	"	" 1.20
18	"	" 19,	"	"	" 1.30

German Silver Tubing thinner than No. 19 B. & S. Gauge add same advances as for Brazed Brass Tube.

For cutting to special lengths add same advances as for Brazed Brass Tube. Discount 40%.

PRICES OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices fange from 2c. below to 6c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2c. to 3½c. above the price of bullion.